



Displaywriter System

Product Support Manual

S241-6249-0

“Selectric” Element Printer

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SAFETY PRECAUTIONS

All IBM Customer Engineers are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.

Mechanical Safety:

1. *Safety glasses must be worn.*
2. *All safety devices, such as guards, shields, signs, ground wires, etc., must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.*
3. *Watches, rings, necklaces, ID bracelets, etc., must be removed when servicing the machine.*
4. *Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.*

Electrical Safety:

1. *The equipment referenced in this manual may use high voltages. Check voltage labels!*
2. *Safety glasses must be worn when checking energized circuits.*
3. *If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.*
4. *Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips, machine frame, etc.*
5. *Meter continuity checks should be used instead of voltage checks whenever possible.*
6. *Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine.*

General Safety:

1. *Each Customer Engineer is responsible to be certain no action on his/her part makes the product unsafe or exposes customer personnel to hazards.*
2. *Store the removed machine covers in a safe, out of the way place where no one can trip over them.*
3. *If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.*
4. *Always place CE tool kit away from walk areas where no one can trip over it.*
5. *Maintain safe conditions in the area of the machine while performing and after completing maintenance.*
6. *Before starting the equipment, make sure fellow CEs and customer personnel are not in a hazardous position.*
7. *All the machine covers must be in place before the machine is returned to the customer.*

Note: Refer to the Safety CEMs relating to this product(s) for further safety precautions.

INTRODUCTION

This manual is written for both U.S. and World Trade usage. It contains sections for adjustments and diagnostics.

ADJUSTMENT SECTION

Purpose

This section provides experienced service personnel a reference for the most commonly used adjustments. Refer to other product publications if additional information is needed.

Adjustment Identification

The headline of each page shows the name of the mechanism covered on that page. Each adjustment is indicated by a black frame number on the top left corner, followed by the adjustment name. The machine mode, view of the drawing and safety precautions are also noted when required.

Adjustment Sequence

The frame numbers indicate the sequence of adjustments. One adjustment could affect a following adjustment. Therefore, check all the following adjustments in that mechanism.

Red numbers on the bottom left corner of the frame indicate adjustments out of sequence that could be affected and should be checked.

Adjustment Procedure

The part to be adjusted is colored red and a red arrow shows the direction of movement. Tolerances and/or additional information on how to perform the adjustment are shown when required.

Always use the adjustment tolerance shown in the publication with the latest date.

DIAGNOSTICS SECTION

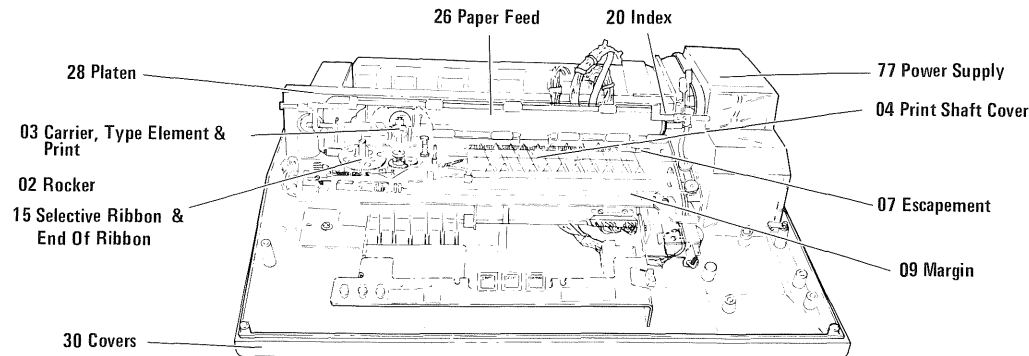
Functional Checks — Provide a reliable procedure to test the different mechanisms for failure.

Flow Charts — Provide a block logic procedure of finding problem areas.

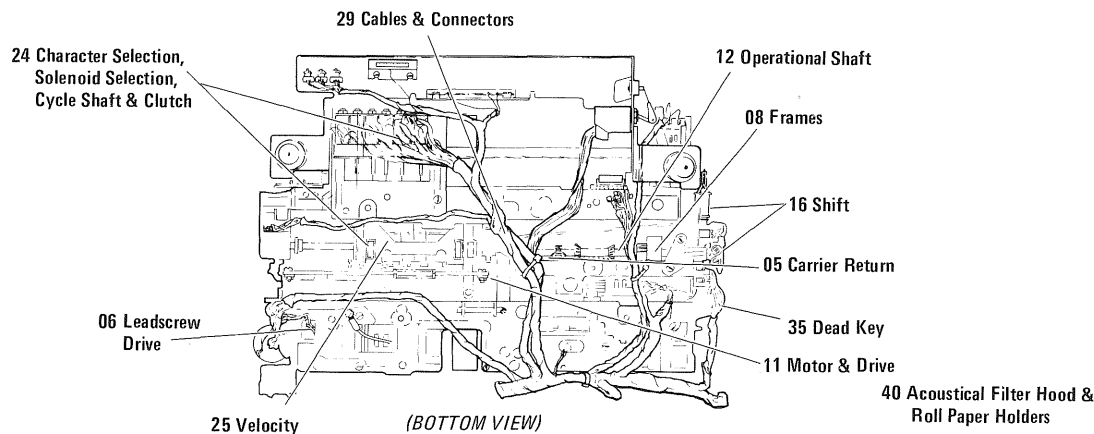
Printer Tests — Provide procedures to exercise the printer.

Wiring Diagrams — Provide point-to-point wiring and resistance readings for trouble-shooting.

Refer to other product publications when additional diagnostics are needed.



(FRONT VIEW)



(BOTTOM VIEW)

CONTENTS (Alphabetical)

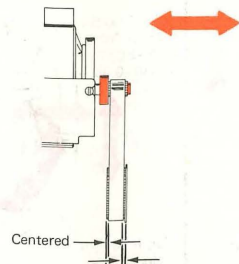
ADJUSTMENTS

Mechanism	Frame	Page
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Alignment	53	5
Backspace	93	9
Carrier Return	105	10
Character Selection	16	2
Covers	183	18
Cycle Shaft & Clutch	16	2
Dead Key	90	9
End of Ribbon	181	18
Escapement	82	8
Index	127	12
Index Feedback	132	13
Leadscrew Drive	93	9
Mainspring & Cords	100	10
Margin	158	15
Motor & Drive	1	1
Out-of-Paper Feature	154	15
Paper Bail	122	12
Paper Feed	115	11
Pinfeed Platen	148	14
Platens	65	6
Print	65	6
Reverse Indexing	135	13
Selective Ribbon	160	15
Shift	6	1
Solenoid Selection	28	3
Velocity	77	7

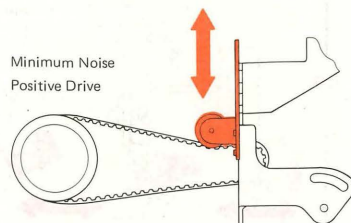
DIAGNOSTICS

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Blown Fuse Check	43
Cycle Maintenance Procedures	48
Data Wrap Test	42
DC Voltage Distribution	39
Error Identification/Recovery	46
Function Chart Symbols	26
Function Charts	
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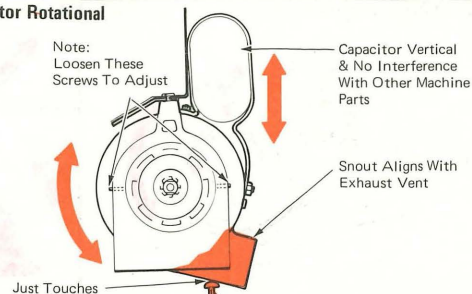
1 Drive Belt



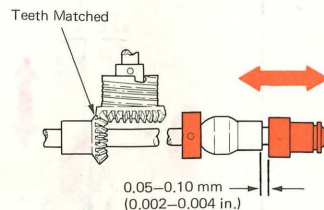
2 Drive Belt Idler



3 Motor Rotational

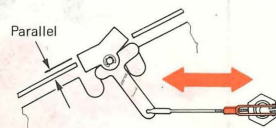


4 Operational Shaft End Play

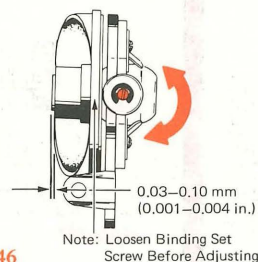


100

5 On/Off Switch Link

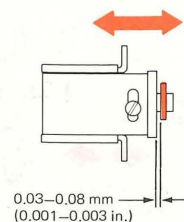


6 Shift Cam Backup Roller

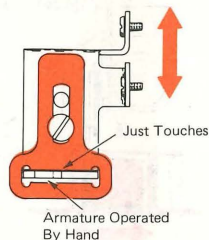


4, 46

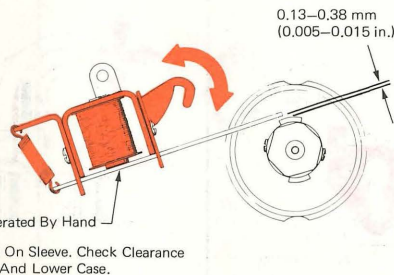
7 Shift Sleeve End Play



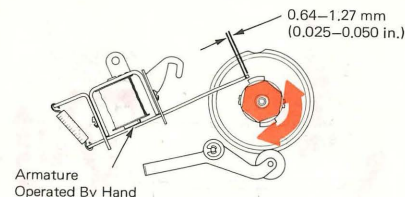
8 Shift Magnet Upstop



9 Shift Magnet Bracket



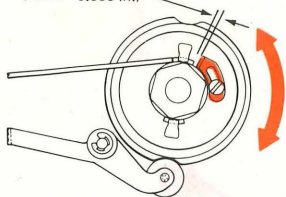
10 Shift Clutch Sleeve



-2- Shift, Character Selection

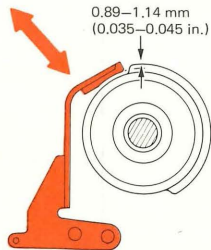
11 Shift Overthrow Stop

0.25–0.76 mm
(0.010–0.030 in.)



12 Shift Cam Brake

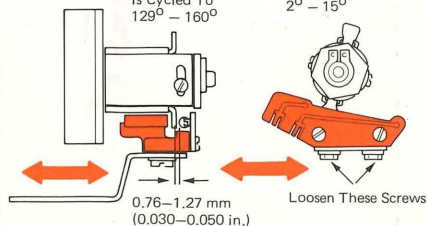
0.89–1.14 mm
(0.035–0.045 in.)



13 Shift Feedback

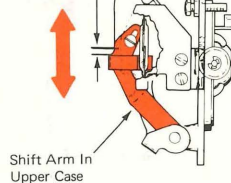
Switch Reopens
When Machine
Is Cycled To
129° – 160°

Note:
Switch Should
Close Between
2° – 15°



14 Magnet Position

From Reed Switch
Contact Point
0.76–2.03 mm
(0.030–0.080 in.)

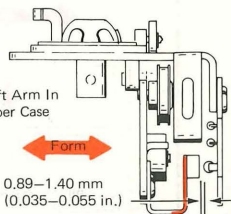


15 Shift Mode

Shift Arm In
Upper Case

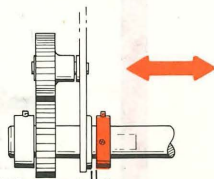
Form

0.89–1.40 mm
(0.035–0.055 in.)



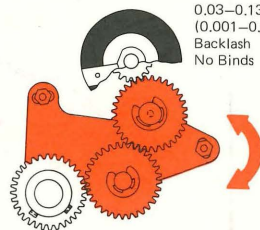
16 Cycle Shaft End Play

0.03–0.08 mm
(0.001–0.003 in.)



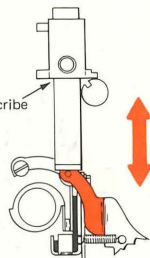
17 Idler Gears

0.03–0.13 mm
(0.001–0.005 in.)
Backlash
No Binds



18 Cycle Clutch Latch Height

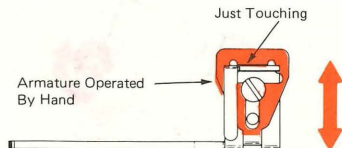
No. 3 Scribe
Line



19 Cycle Clutch Armature Pivot Plate

Just Touching

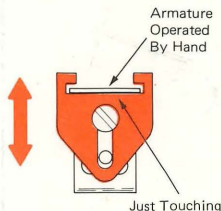
Armature Operated
By Hand



20 Cycle Clutch Armature Upstop

Armature
Operated
By Hand

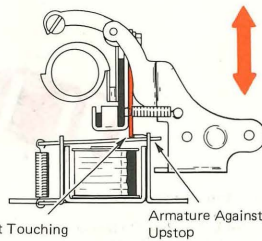
Just Touching



21 Cycle Clutch Armature Latch

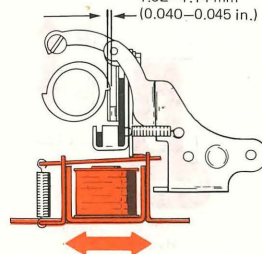
Just Touching

Armature Against
Upstop

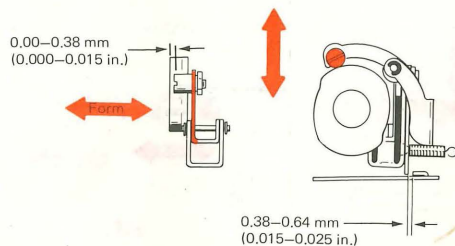


22 Cycle Clutch Latch Bite

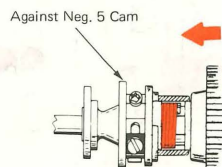
1.02–1.14 mm
(0.040–0.045 in.)



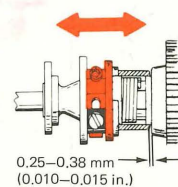
23 Cycle Clutch Restoring Roller



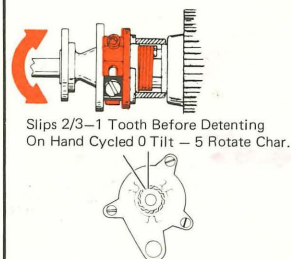
24 Cycle Clutch Spring Lateral



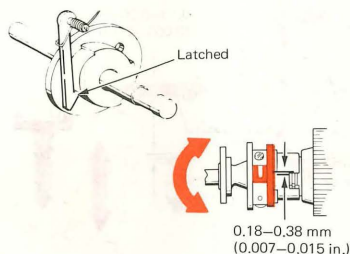
25 Cycle Clutch Sleeve End Play



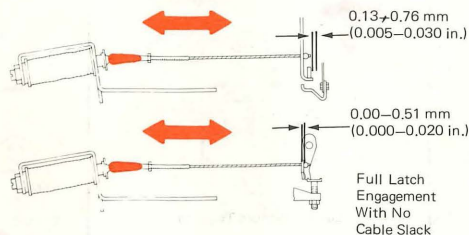
26 Cycle Clutch Spring Rotational



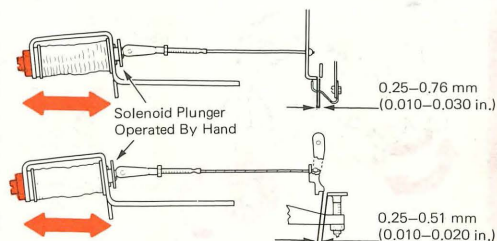
27 Cycle Clutch Overthrow Stop



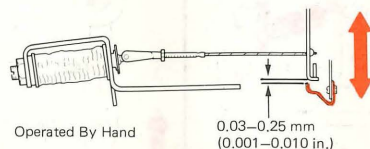
28 Selection Latch Cables



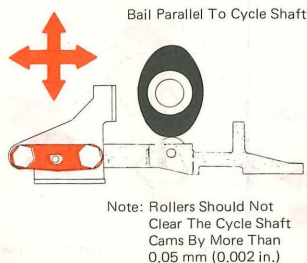
29 Selection Latch Motion



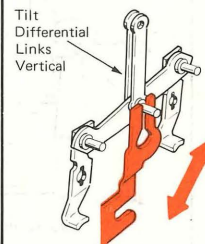
30 Latch Lock-In Plate



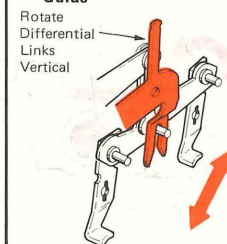
31 Latch Bail Shaft



32 Tilt Differential Guide

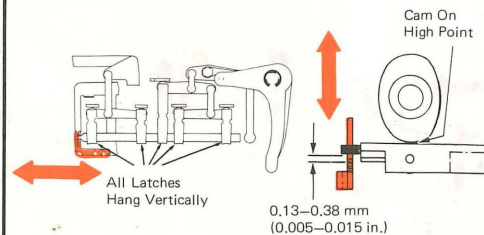


33 Rotate Differential Guide

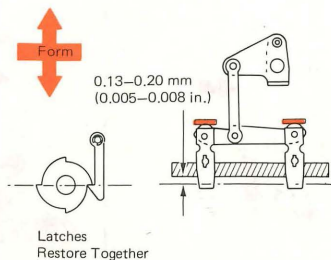


4- Character Selection

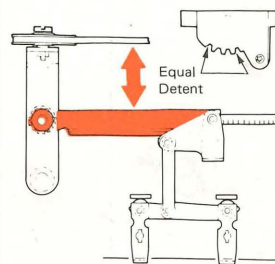
34 Latch Bail Guide



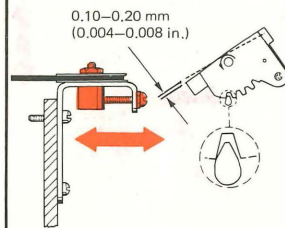
35 Tilt Latches



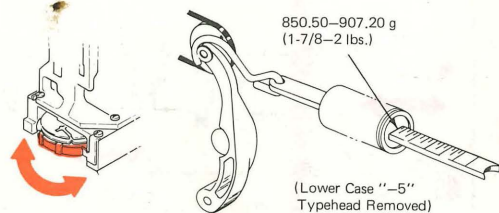
36 Tilt Arm Motion



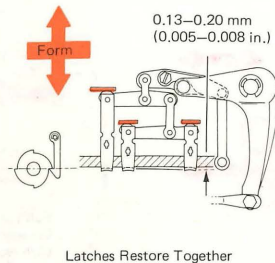
37 Tilt Ring Homing



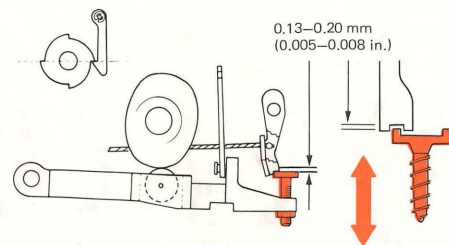
38 Rotate Spring



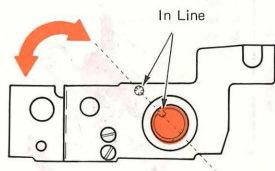
39 Rotate Latches



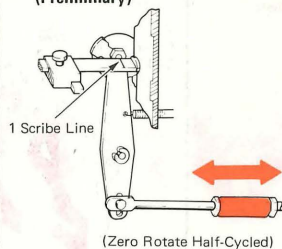
40 Five-Unit Latch



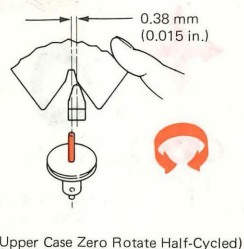
41 Print Shaft Timing (Preliminary)



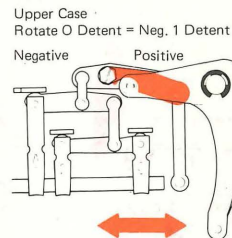
42 Rotate Arm Vertical (Preliminary)



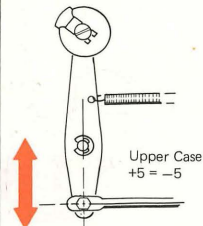
43 Coarse Homing



44 Balance Lever

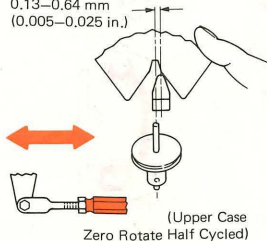


45 Rotate Arm Motion



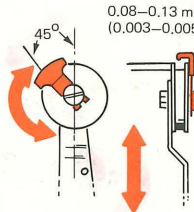
46 Typehead Fine Homing

0.13–0.64 mm
(0.005–0.025 in.)



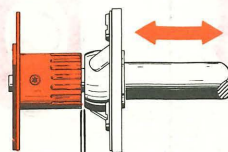
47 Rotate Pulley Guard

0.08–0.13 mm
(0.003–0.005 in.)



48 Print Shaft End Play

0.05–0.10 mm
(0.002–0.004 in.)

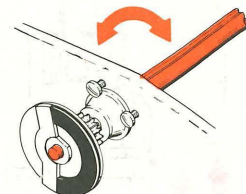


49 Print Shaft Timing (Final)

Just Touching
On Withdrawal

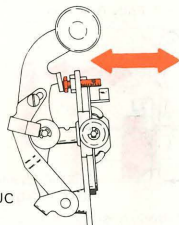
—5 Character

48



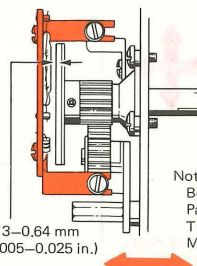
50 Shift Motion

LC = UC



51 Print Feedback Bracket

0.13–0.64 mm
(0.005–0.025 in.)



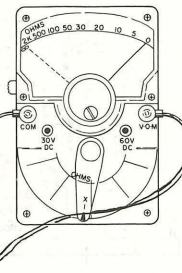
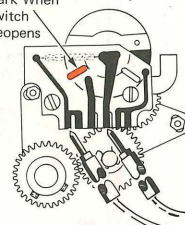
Note:
Board
Parallel
To
Magnet

52 Print Feedback Switch

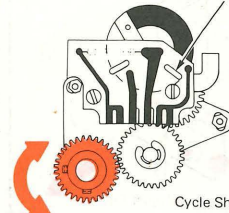
Hand Cycle
Machine,
Mark When
Switch
Reopens

Note: Don't
Scribe Magnet

49



Adjust So
Mark Appears
In Forward Slot

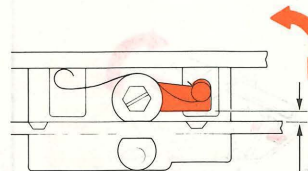
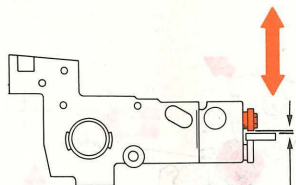


Cycle Shaft
Latched At Rest

53 Rear Carrier Shoe

Rear Carrier Shoe Tension

0.03–0.08 mm
(0.001–0.003 in.)

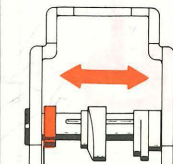


Parallel To Rear Support

Note: Reset Spring Tension After
Loosening Rear Carrier
Mounting Shoe Screw.

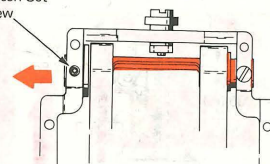
54 Print Sleeve End Play

0.03–0.10 mm
(0.001–0.004 in.)



55 Rocker End Play

Loosen Set
Screw

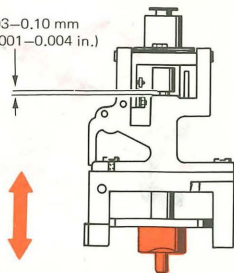


No End Play No Binds

-6- Alignment, Print

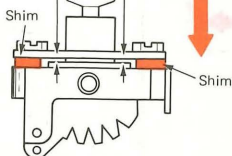
56 Rotate Shaft End Play

0.03–0.10 mm
(0.001–0.004 in.)



57 Upper Ball Socket

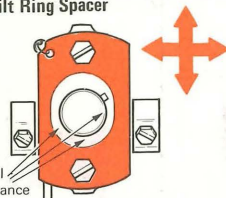
Minimum Play No Binds



58 Tilt Ring Spacer

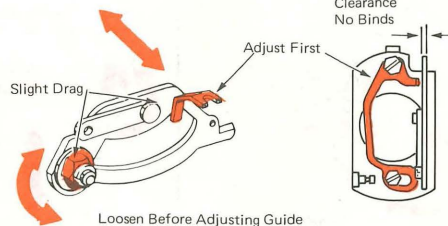
Equal
Clearance

Note: Type Element Must Be Lubricated
With No. 23 Grease Or Silicone
Lubricant On The Inner Surface.



59 Rotate Detent

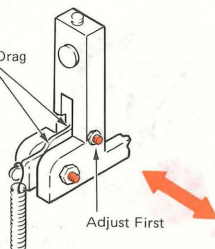
Minimum
Clearance
No Binds



60 Tilt Detent

Slight Drag

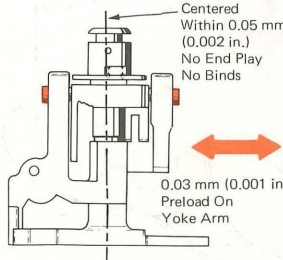
Adjust First



61 Tilt Ring

Centered
Within 0.05 mm
(0.002 in.)
No End Play
No Binds

0.03 mm (0.001 in.)
Preload On
Yoke Arm



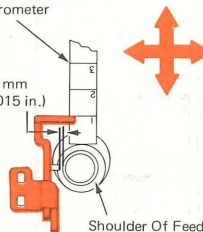
49

62 Detent Cam Follower Bracket

Hooverometer

0.13–0.38 mm
(0.005–0.015 in.)

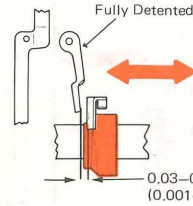
Shoulder Of Feed
And Detent Cam



63 Detent Cam

Fully Detented

0.03–0.25 mm
(0.001–0.010 in.)

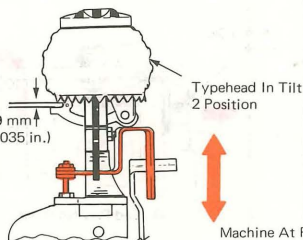


64 Skirt Clearance

0.51–0.89 mm
(0.020–0.035 in.)

Typehead In Tilt
2 Position

Machine At Rest

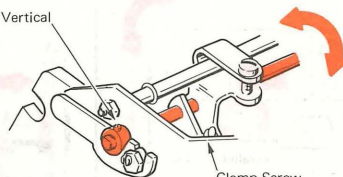


49

65 Copy Control Shaft Clamp

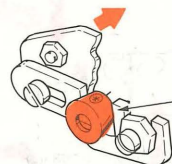
Vertical

Clamp Screw



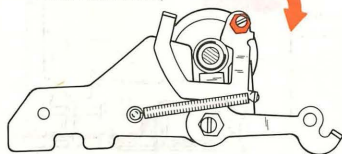
66 Copy Control Eccentric

Touching

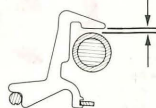
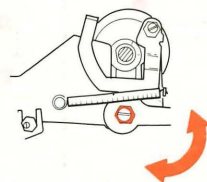


67 Platen Latches

Holds Platen Firmly

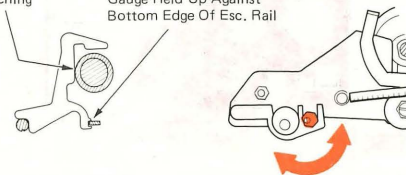


68 Platen Height Preliminary

0.76 mm
(0.030 in.)Gauge Held Up Against
Bottom Edge Of Esc. Rail

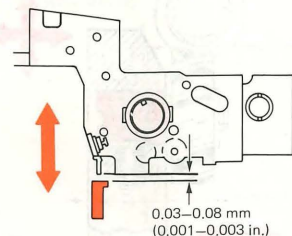
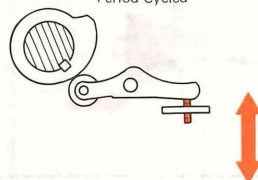
69 Platen Front-To-Rear

Touching

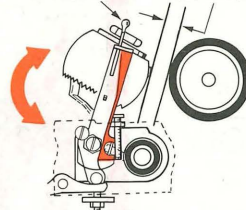
Gauge Held Up Against
Bottom Edge Of Esc. Rail

68,125

70 Front Carrier Support

Note:
Check With Carrier At Both Ends71 Print Cam Follower
Stop ScrewRoller Contacts Cam
Within Keyway With
Period Cycled

72 Powered Flight

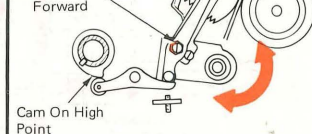
Position 4
5.08 mm (0.200 in.)

(At Rest)

73 Free Flight

0.36-0.51 mm
(0.014-0.020 in.)

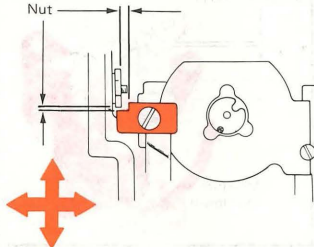
Position 1

High Point
ForwardCam On High
Point

(Cycle A "Z")

72

74 Rocker Upstop

Clears
Nut

75 Platen Height Final

Adjust For Even Top
And Bottom Printing

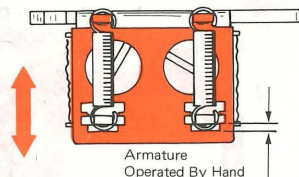
117,125

76 Yoke Position

Even Printing
"Side To Side"

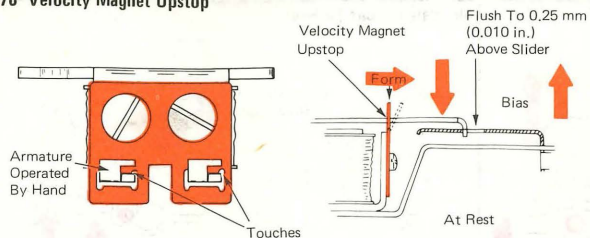
46

77 Velocity Magnet Pivot Plate

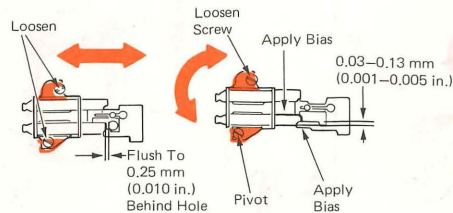
Armature
Operated By Hand0.03-0.08 mm
(0.001-0.003 in.)

8- Velocity, Escapement

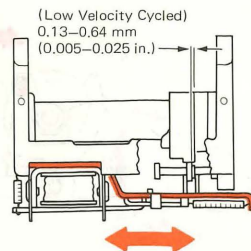
78 Velocity Magnet Upstop



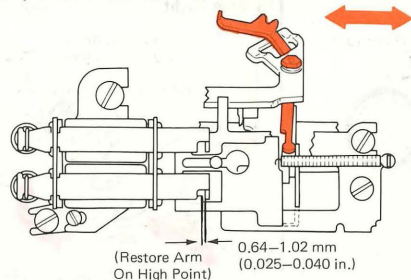
79 Magnet Pack



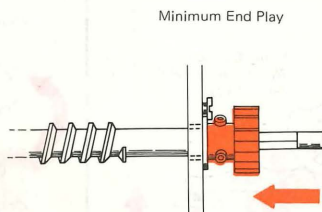
80 Velocity Magnet Assembly



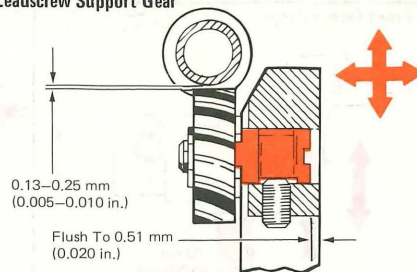
81 Velocity Slider Overthrow



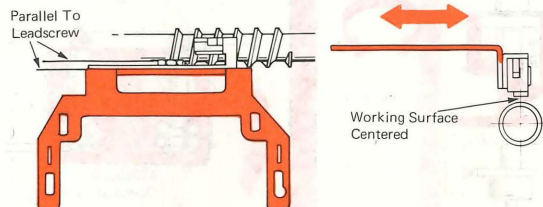
82 Leadscrew Ratchet



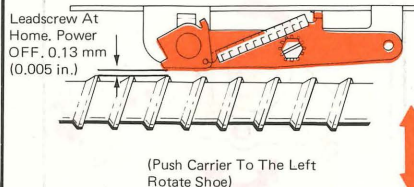
83 Leadscrew Support Gear



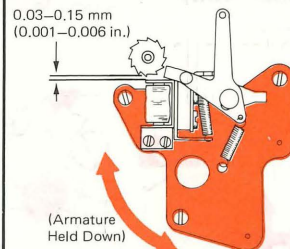
84 Escapement Bracket

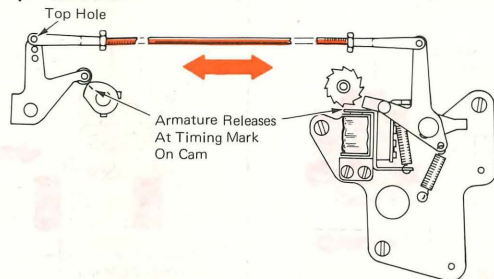
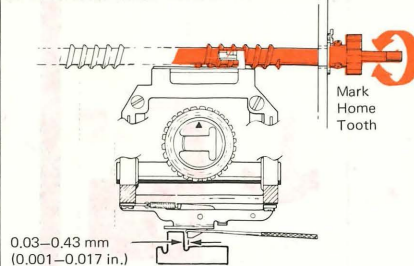
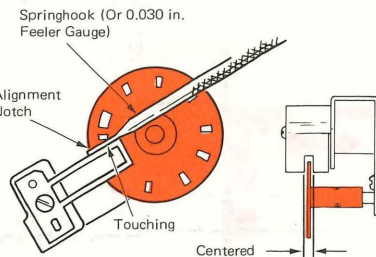
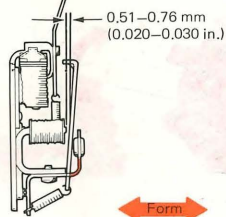
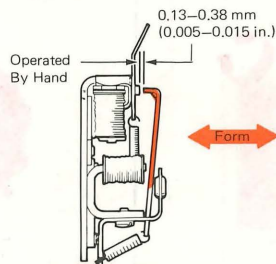
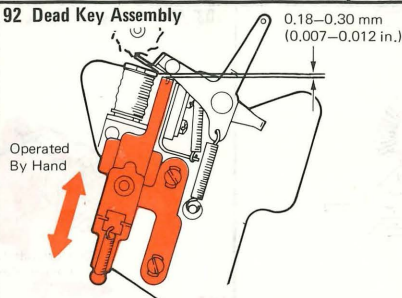
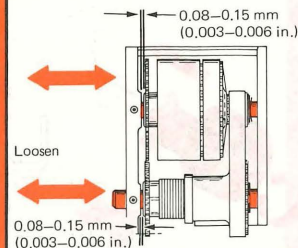
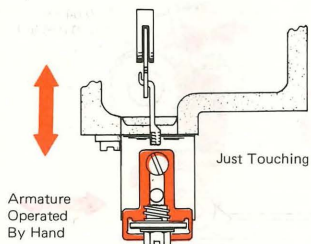
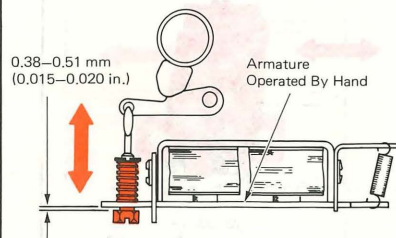
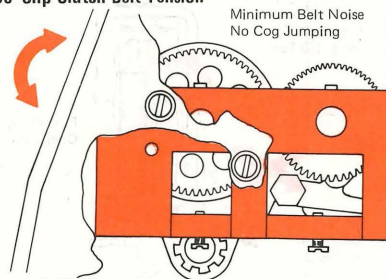
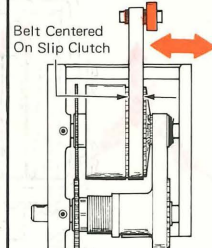


85 Leadscrew Shoe

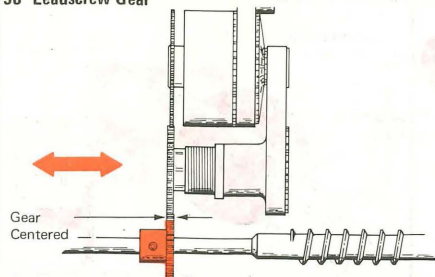


86 Escapement Magnet Plate

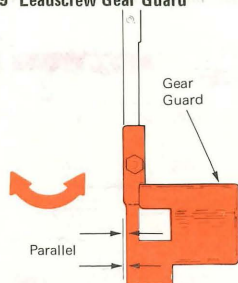


87 Escapement Link

88 Leadscrew Home Position

89 Emitter Wheel

90 Dead Key Magnet—Armature Upstop

91 Dead Key Magnet—Armature

92 Dead Key Assembly

93 Clutch End Play

94 B/S Armature Upstop

95 Backspace Link

96 Slip Clutch Belt Tension

97 Leadscrew Drive Pulley


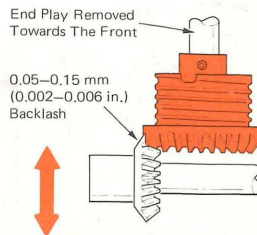
98 Leadscrew Gear



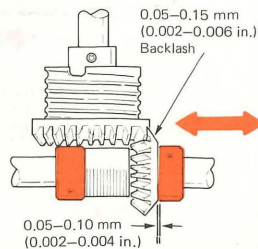
99 Leadscrew Gear Guard



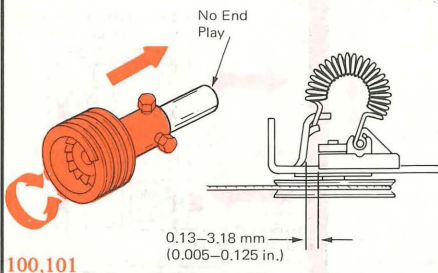
100 Tab Cord Drum



101 Tab Governor Pinion

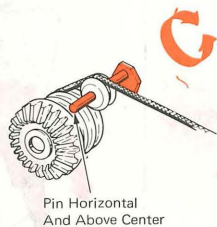


102 Cord Tension



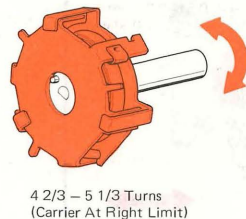
100,101

103 Idler Pulley Eccentric

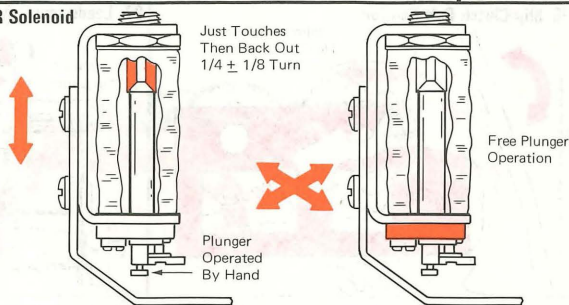


102

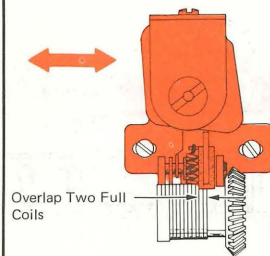
104 Mainspring



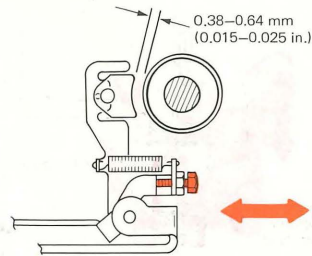
105 C/R Solenoid



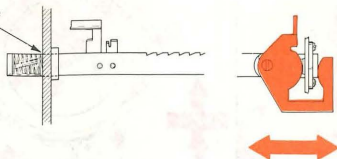
106 C/R Solenoid Assembly



107 C/R Shoe Clearance

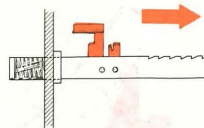


108 Margin Rack Position

Margin Rack
Flush With
Outside Of
Side Frame

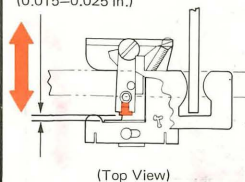
88

109 Margin Rack Final Stop



88

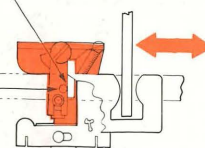
110 Overbank Switch Magnet

0.38–0.64 mm
(0.015–0.025 in.)

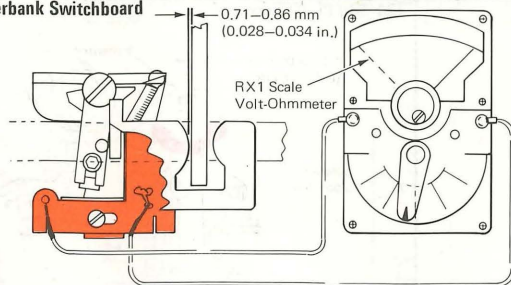
111 Overbank Switch Assembly

Just Touches At Rest

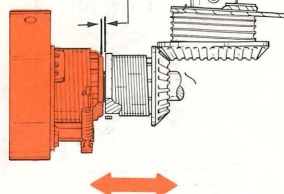
Post



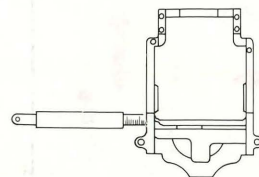
112 Overbank Switchboard

0.71–0.86 mm
(0.028–0.034 in.)RX1 Scale
Volt-Ohmmeter

113 Torque Limiter Arbor End Play

0.05–0.13 mm
(0.002–0.005 in.)

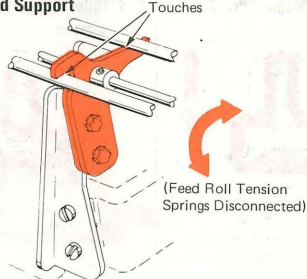
114 C/R Torque Limiter

453.60–907.20 g
(1–2 lbs.)

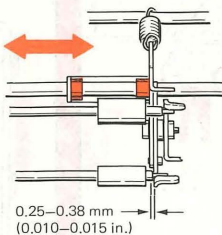
Form

115 Paper Feed Support

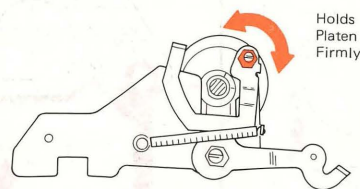
Touches



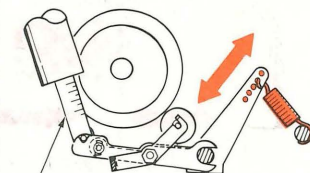
116 Feed Roll End Play



117 Platen Latches



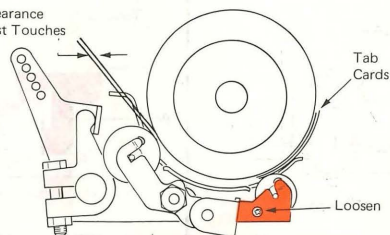
118 Feed Roll Tension

907.20–1134.00 g
(32–40 oz.)

-12- Paper Feed, Index

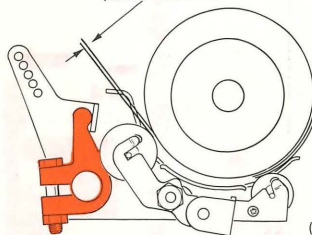
119 Feed Roll Adjustment

3 Cards—Clearance
2 Cards—Just Touches



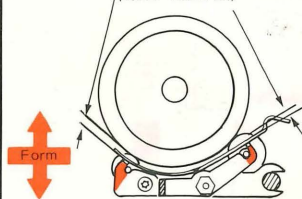
120 Paper Release

1.40—1.90 mm
(0.055—0.075 in.)

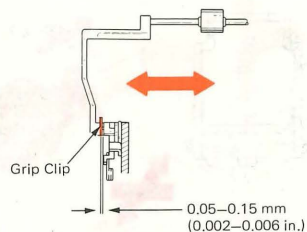


121 Deflector Clearance

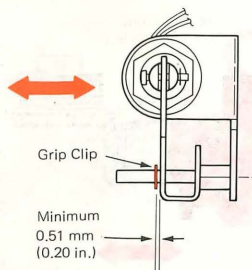
0.25—0.51 mm
(0.010—0.020 in.)



122 Paper Bail Arm

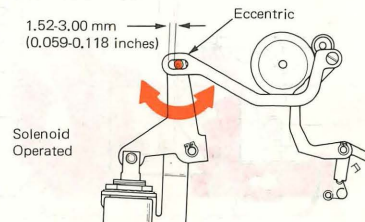


123 Bail Closer Bellcrank

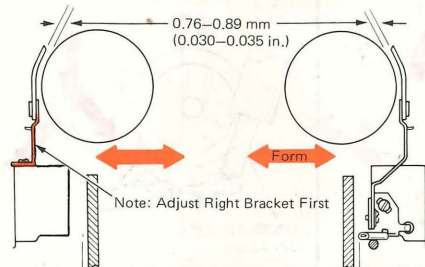


124 Bail Closer Eccentric

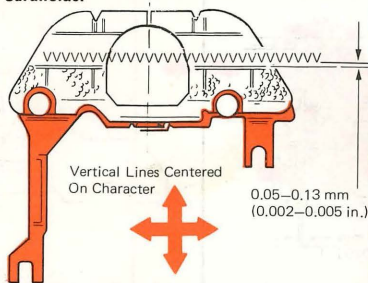
1.52—3.00 mm
(0.059—0.118 inches)



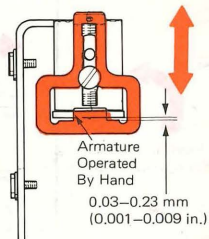
125 Cardholder Bracket



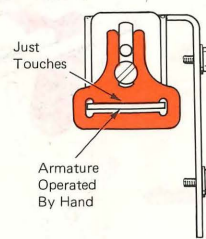
126 Cardholder



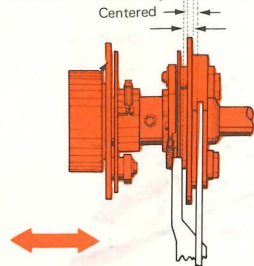
127 Index Magnet Pivot Plate



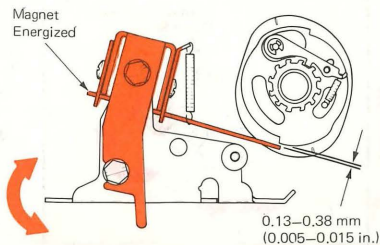
128 Index Magnet Armature Upstop



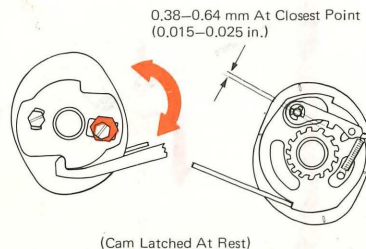
129 Index Cam Assembly



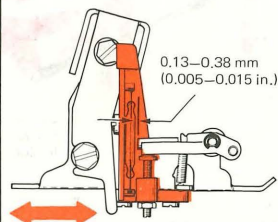
130 Index Cam Release Clearance



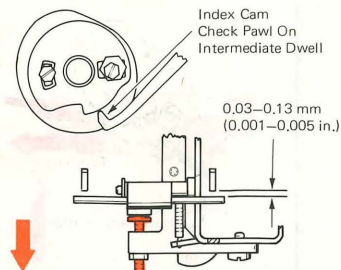
131 Index Clutch Pawl Clearance



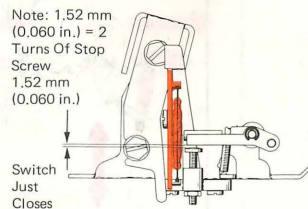
132 Index Feedback Magnet



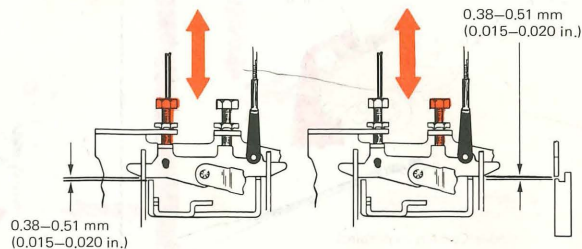
133 Index Feedback Stop Screw



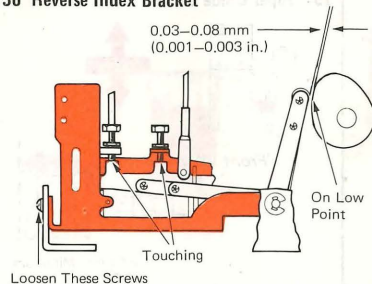
134 Index Feedback Circuit Board



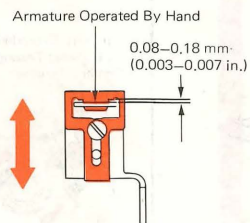
135 Index Lever Stop Screws



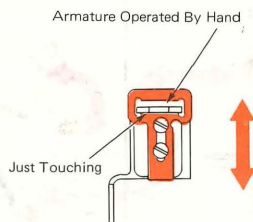
136 Reverse Index Bracket



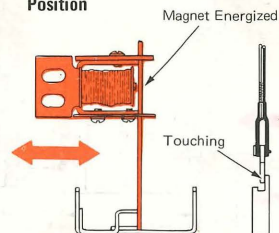
137 Reverse Index Magnet Pivot Plate



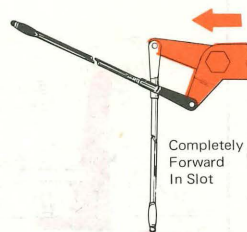
138 Reverse Index Magnet Upstop



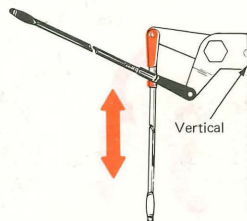
139 Reverse Index Magnet Position



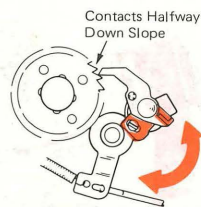
140 Reverse Index Intermediate Bellcrank



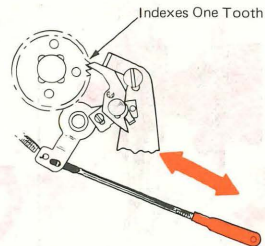
141 Reverse Index Intermediate Link



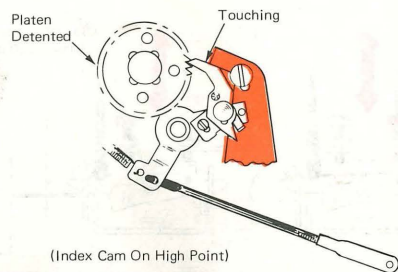
142 Reverse Index Pawl Locator



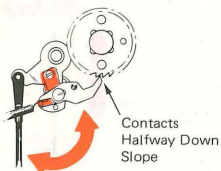
143 Reverse Index Link



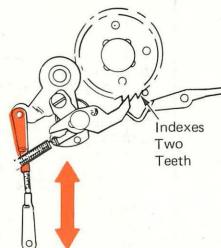
144 Reverse Overthrow Stop



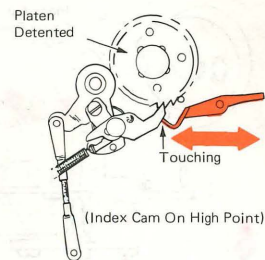
145 Forward Index Pawl Locator



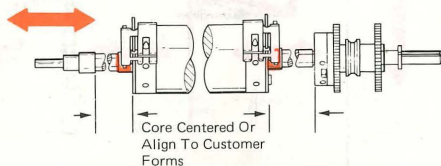
146 Forward Index Link



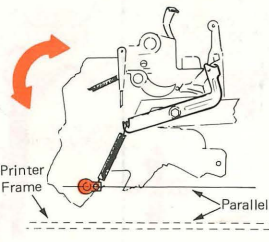
147 Forward Overthrow Stop



148 Pinfeed Platen Core—Lateral Position

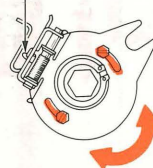


149 Detent Spring Anchor

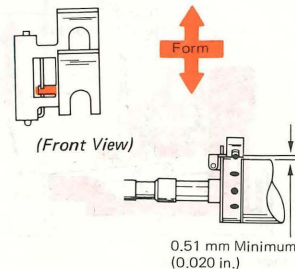


150 Pinwheel Assembly

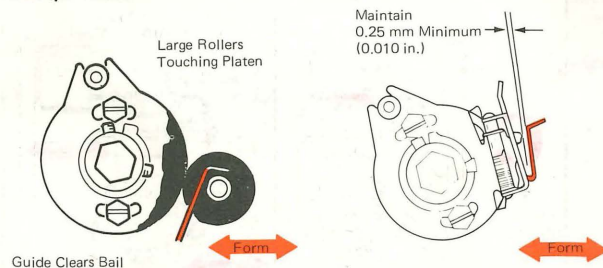
Pin Fully Extended
As It Passes Through
Center Of Guide



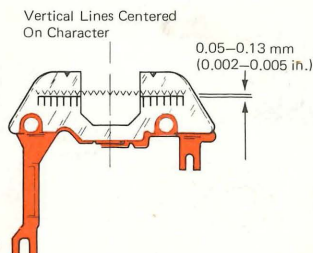
151 Paper Guide Latch



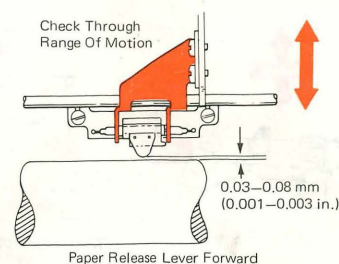
152 Paper Guides



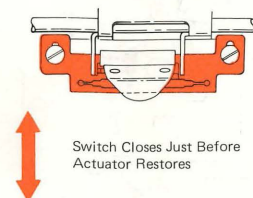
153 Pinfeed Cardholder



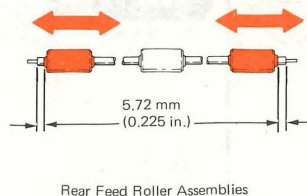
154 Actuator Bracket Assembly



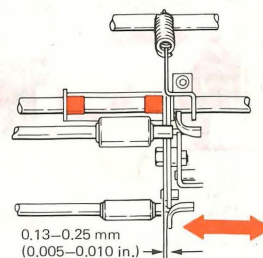
155 Actuator Reed Switch



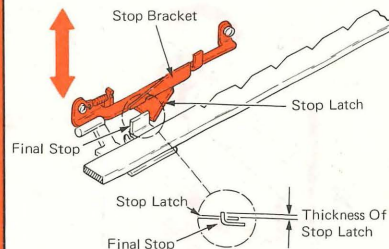
156 Feed Roll Assembly



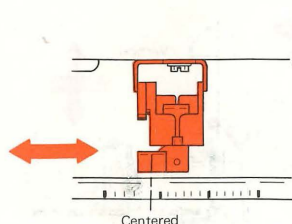
157 Feed Roll End Play



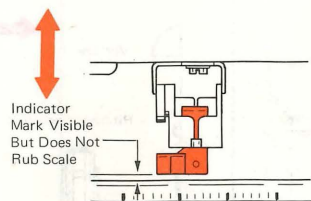
158 Margin Stop Bracket



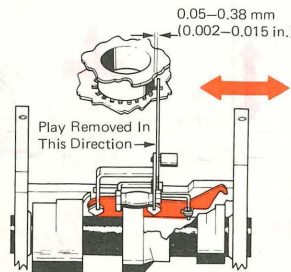
159 Carrier Pointer Left-To-Right



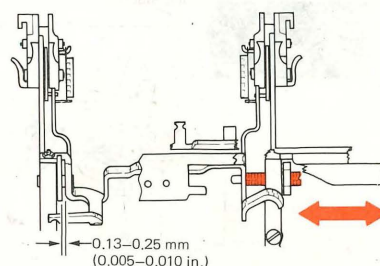
Carrier Pointer Front-To-Rear



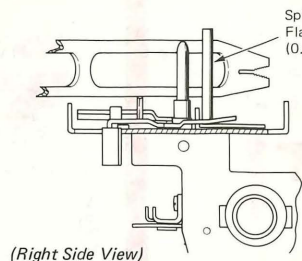
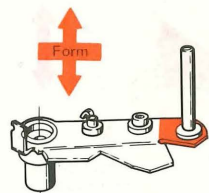
160 Feed Cam Follower Bracket



161 Lift Arm

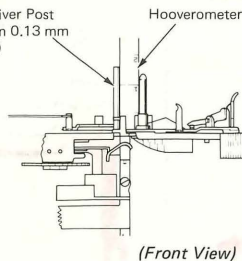


162 Spiked Driver Post



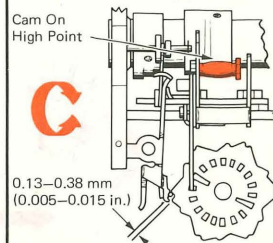
(Right Side View)

Spiked Driver Post
Flat Within 0.13 mm
(0.005 in.)



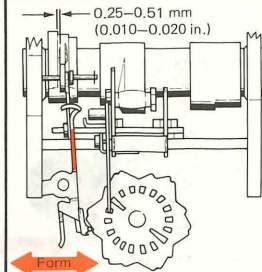
(Front View)

163 Feed Cam Follower Eccentric



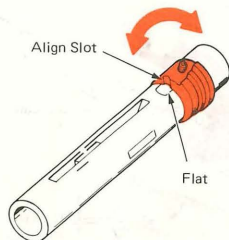
Cam On
High Point
0.13–0.38 mm
(0.005–0.015 in.)

164 Lift Control Lever

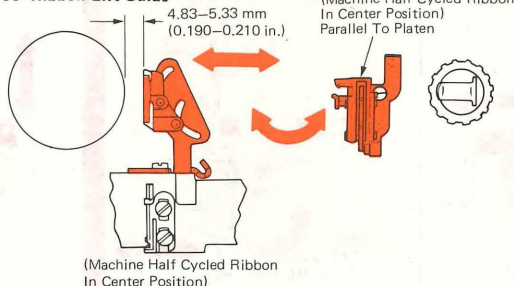


0.25–0.51 mm
(0.010–0.020 in.)

165 Ribbon Lift Cam

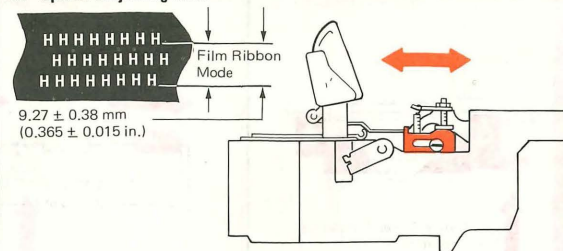


166 Ribbon Lift Guide



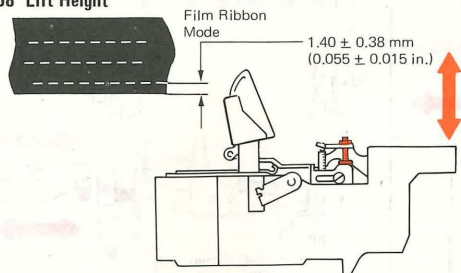
(Machine Half Cycled Ribbon
In Center Position)

167 Spread Adjusting Plate

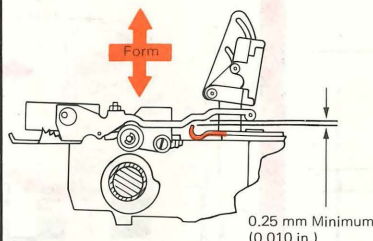


54

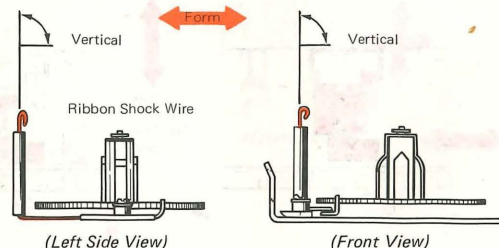
168 Lift Height



169 Lift Arm Lower Stop



170 Shock Wire



(Left Side View)

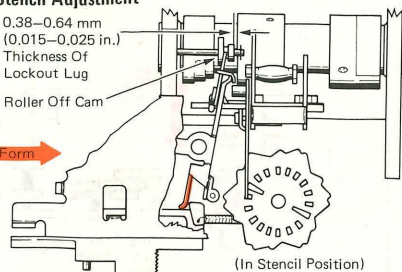
(Front View)

171 Stencil Adjustment

0.38–0.64 mm
(0.015–0.025 in.)
Thickness Of
Lockout Lug

Roller Off Cam

Form



(In Stencil Position)

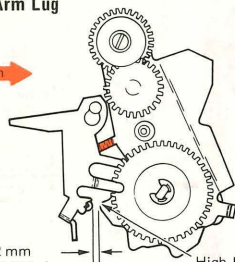
172 Swing Arm Lug

Form

0.76–1.02 mm
(0.030–0.040 in.)

High Lobe

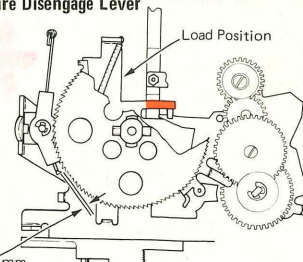
(Tech III Mode)


173 Shock Wire Disengage Lever

Form

Load Position

0.51–1.02 mm
(0.020–0.040 in.)


174 Shock Wire Disengage Lever

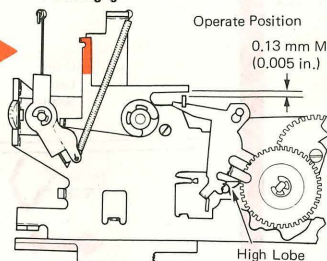
Form

Operate Position

0.13 mm Minimum
(0.005 in.)

High Lobe

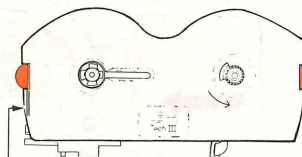
(Tech III Mode)


175 Cartridge Guides

Center

0.13–0.25 mm
(0.005–0.010 in.)

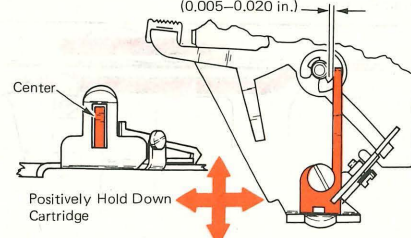
Form


176 Cartridge Retaining Springs

0.13–0.51 mm
(0.005–0.020 in.)

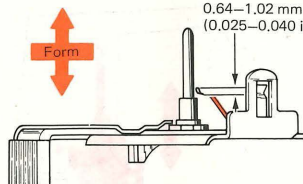
Center

Positively Hold Down
Cartridge


177 Take-Up Core Interlock

Form

0.64–1.02 mm
(0.025–0.040 in.)

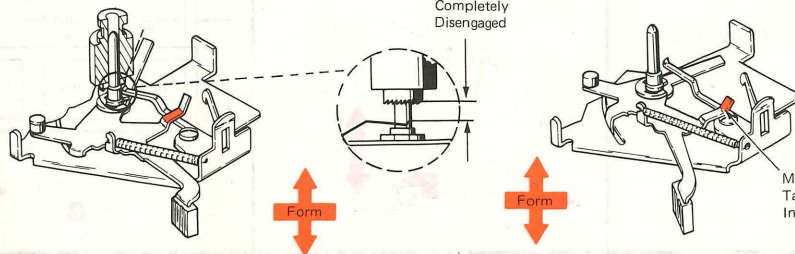

178 Load Lever

Completely
Disengaged

Form

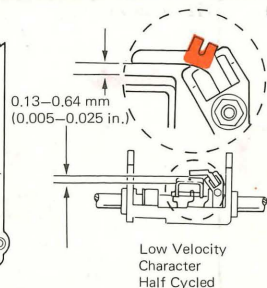
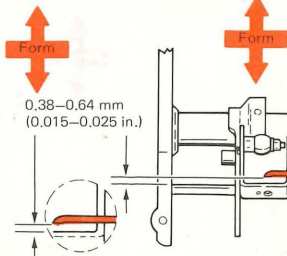
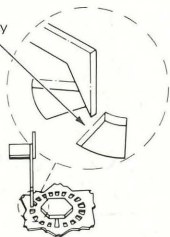
Form

Must Clear
Take-Up
Interlock



179 Ribbon Feed Inhibitor

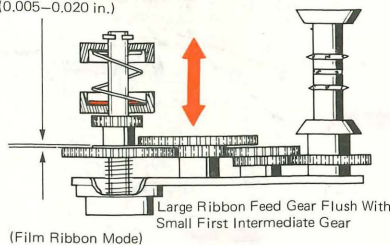
Pawl Resets Not
More Than 1/2 Way
To Next Window
During No Print
Operation



Low Velocity
Character
Half Cycled

180 Mode Button Grip Clip Position

0.13-0.51 mm
(0.005-0.020 in.)

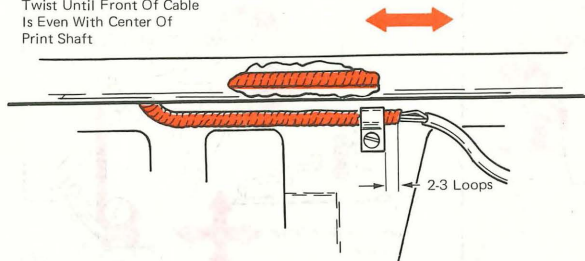


Large Ribbon Feed Gear Flush With
Small First Intermediate Gear

(Film Ribbon Mode)

181 Cable Position

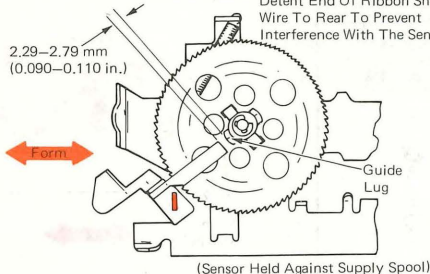
Twist Until Front Of Cable
Is Even With Center Of
Print Shaft



2-3 Loops

182 EOR Sensor Position

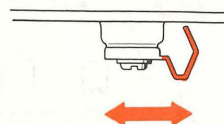
Note: If Necessary, Form The
Detent End Of Ribbon Shock
Wire To Rear To Prevent
Interference With The Sensor



(Sensor Held Against Supply Spool)

183 Top Cover Latch

Cover
Latches
Securely

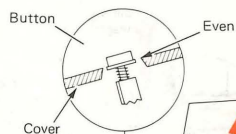


184 Paper Release Lever

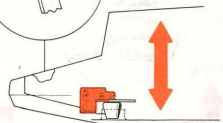
Centered In
Opening



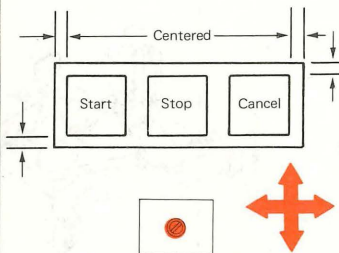
185 Front Mounting Bracket



Cover

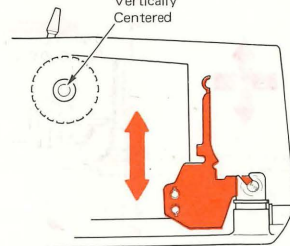


186 Front Feet

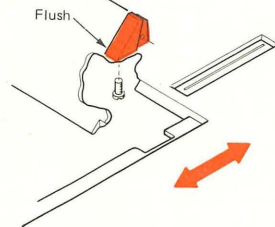


187 Rear Mounting Brackets

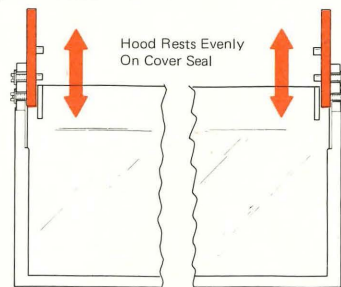
Vertically
Centered



188 Mounting Plates



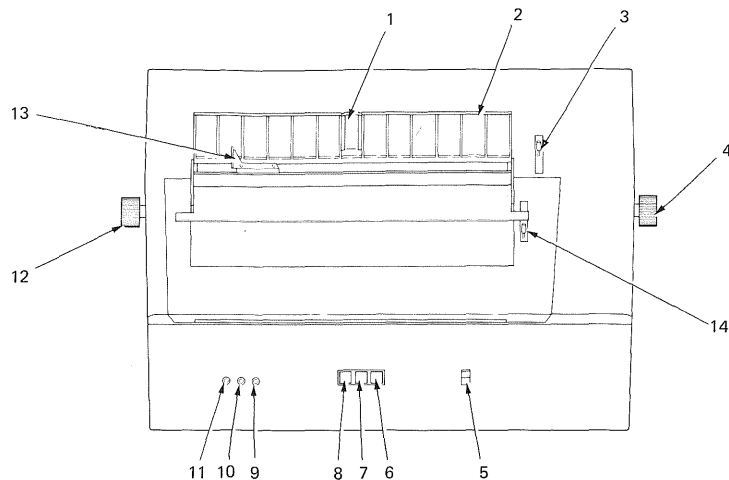
189 Hood



Refer to this chart when performing the functional check.

CAUTION

To prevent unexpected motor starts, always unplug the power saver relay connectors from the CE connector when servicing the printer.



- | | |
|------------------------|-----------------------------------|
| 1. Page End Indicator | 8. START Button |
| 2. Paper Support Table | 9. Ribbon Light |
| 3. Paper Release Lever | 10. Ready Light |
| 4. Platen Knob | 11. Power Light |
| 5. On/Off Switch | 12. Platen Knob & Platen Variable |
| 6. CANCEL Button | 13. Paper Guide |
| 7. STOP Button | 14. Paper Bail Lever |

Functional Check

This functional check procedure will indicate whether or not the printer has a failure. It includes organized checks of every function of the machine in an efficient sequence. Using this procedure on every service call will help locate failures, and it will ensure the machine is working properly after repairs are made.

1. Visual Inspection — Examine the machine for any obviously loose, damaged or missing parts. Also look for foreign material in the machine: pencils, erasers, paper clips, etc.
2. Paper Insertion — Roll a single piece of paper into the machine. It should not wrinkle or tear.
3. Paper Release — Pull the paper bail forward. Notice that the feed rolls still hold the paper firmly. Now, pull the paper release lever forward. You should be able to easily reposition the paper left and right.
4. Platen Variable — Push in the left platen knob. The platen should now turn freely; the ratchet on the right end of the platen should not turn. When the knob is released, the platen should detent reliably.
5. On/Off Switch — Turn power off then back on. The printer AC motor should start and the power supply fan should be running. This is an indication the AC power to the printer and power supply is good.
6. Load the CE diagnostic diskette on the system and select the printer exerciser. With the impression control on 3, roll a single sheet of bond paper in the machine. Place the paper bail forward against the platen.

Press the START button on the operator control panel. The first functional test should print out.

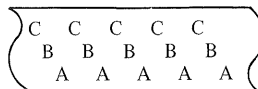
7. Operator Control Panel — Press the CANCEL button, then the START button. The second functional test should begin printing.

Using the START, STOP and CANCEL buttons, play out all of the remaining functional tests.

8. Print Quality — Check the functional test play-out. All characters should have even color. No character should be obviously out of position. There should be even spacing between characters with no overlap.

9. Selective Ribbon System

- A. Inspect the copy for ribbon flaking; that is, splattering of ribbon particles on the copy.
- B. With a film ribbon installed on your machine, the lift pattern should look like this:



Inspect the lift pattern on the machine. The characters should not overlap one another, and the characters should be positioned on the ribbon with a margin of safety at the top and bottom.

With a Tech III ribbon installed on the machine, inspect the ribbon pattern. The characters should overlap one another and there should be a margin of safety at the

top and bottom of the ribbon. The printing must not fade.

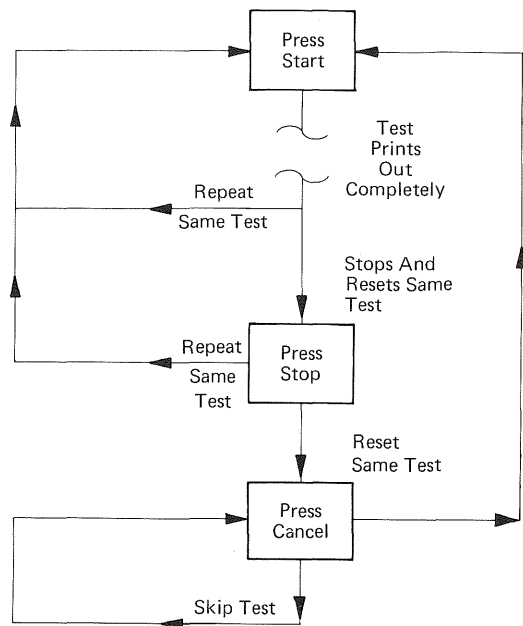
- C. Inspect the ribbon throughout its path around the various guides and rollers. There should be no creases in the ribbon.

- D. Place the stencil control lever in the stencil position and print several characters. The ribbon should not feed or lift.

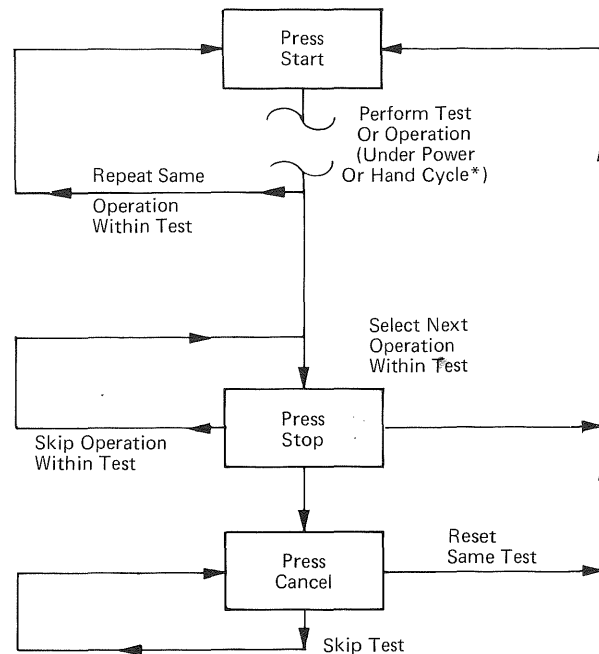
10. Reset the impression control to its original position.

A complete functional exercise of the printer can be performed by loading the CE diagnostic diskette and selecting the printer exercise from the diskette. Individual exercises within the test may be repeated to aid in troubleshooting and to verify correct operation of the printer after a repair has been performed. Tests will be printed in 10 pitch.

FUNCTIONAL TEST



DIAGNOSTIC/ADJUSTMENT TEST



*CE Jumper Removed and CE Service Connector Unplugged

e TAB TEST

1	2	3	4	5	6	7	8	9	0
11	22	33	44	55	66	77	88	99	00
111	222	333	444	555	666	777	888	999	000
1111	2222	3333	4444	5555	6666	7777	8888	9999	0000
111	222	333	444	555	666	777	888	999	000
11	22	33	44	55	66	77	88	99	00
1	2	3	4	5	6	7	8	9	0

f WORD UNDERSCORE TEST

Now is the time for all good citizens to come to the aid of their country.

g OVERBANK TEST

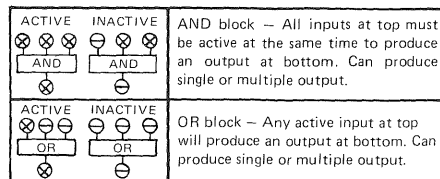
O
V
E
R
B
A
N
K

h REVERSE INDEX TEST

The green grass grew on the side of a hill. The bells can
be heard any time of day. Zebra we if give ours is little extra.
men, Quickly ever conquer the world? Some say yes, others say no. Will we

FUNCTION CHART SYMBOLS

	An electrical or mechanical assembly is activated (solenoids, relays, motors).
	An electrical or mechanical assembly is returned to the inactive state.
	An electronic assembly is operated (power supplies, transistors, etc.).
	An electronic assembly returns to its unoperated or normal condition.
	Connector (accessory connector, M-connector, etc.).
	Time delay.
	Indicates a line that starts or is continued elsewhere. (A note will specify where.)
	Indicates a note about a particular point or component.
	Circuit board, planar package, etc. (Name of board, etc., will be indicated.)
	Test point.
	The dotted line indicates that there is a mechanical connection between the two operations.
	Used to show all contact-type components and solid logic signals. The condition (N/C, N/O, etc.) of these components or signals will be indicated in the bracket.
	Decision block.



Solenoids Operated

	R1 R2 R2A R5	- R2 R2A R5	R1 - R2A R5	- R2A R5	R1 - R5	R1 R2 R2A	- R2 R2A R5	R1 - R2A R5	R1 - R5	- R5		
T1	[#	&	*	\$	Z	@	%	¢)	(T-0
T2		3	7	8	4	2	5	6	0	9		
- T2	X	U	D	C	L	T	N	E	K	H	B	T-1
T1	M	V	R	A	O	!	.	"	I	S	W	T-2
-	G	F	:	'	?	/	J	=	P	Q	Y	T-3
	-5	-4	-3	-2	-1	Home	+1	+2	+3	+4	+5	

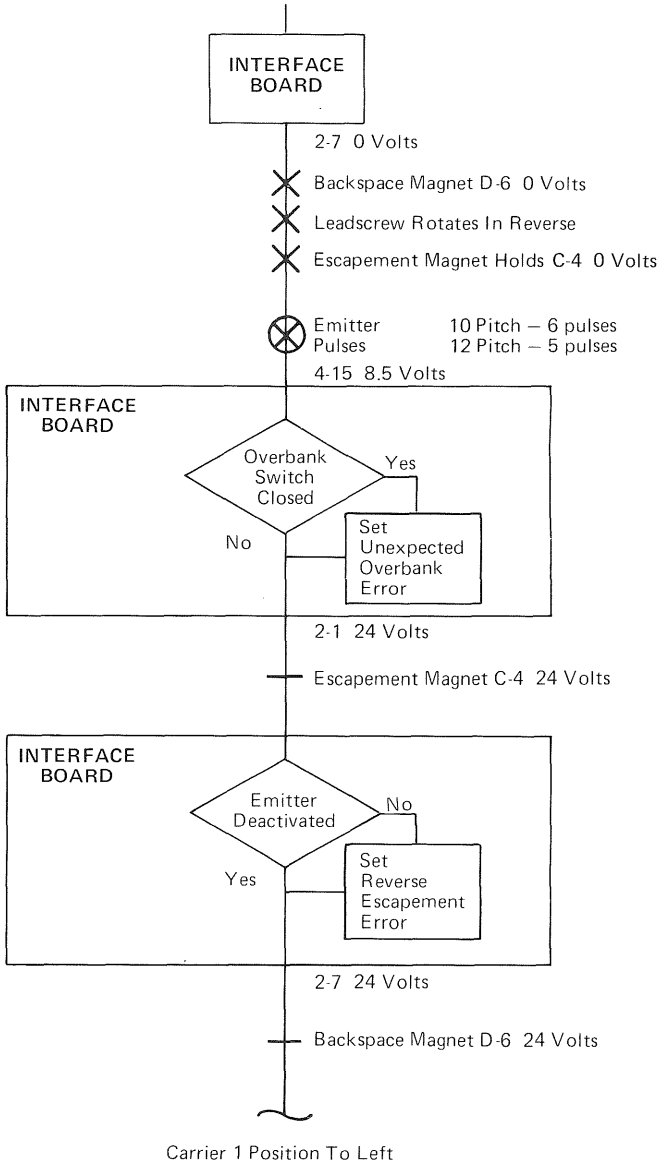
Typehead Selection

Space and Tab. . . T1, T2, R1, R2, & R2A

Typehead Selection

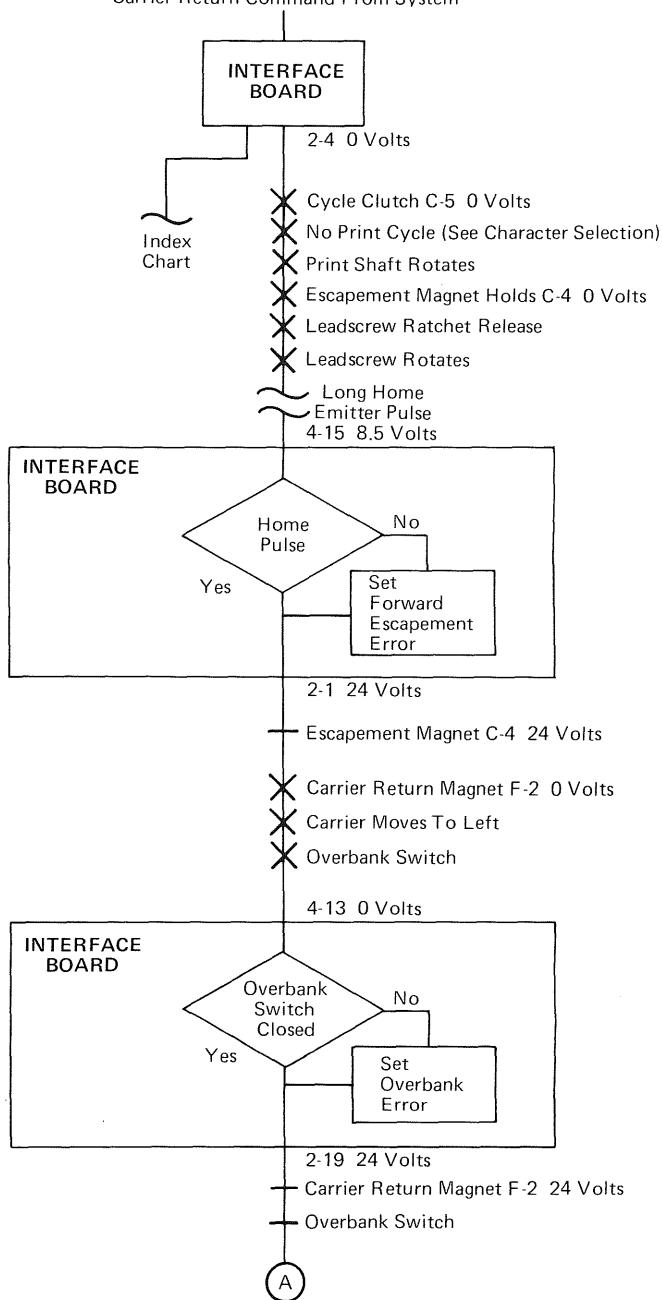
BACKSPACE

Backspace Command From System

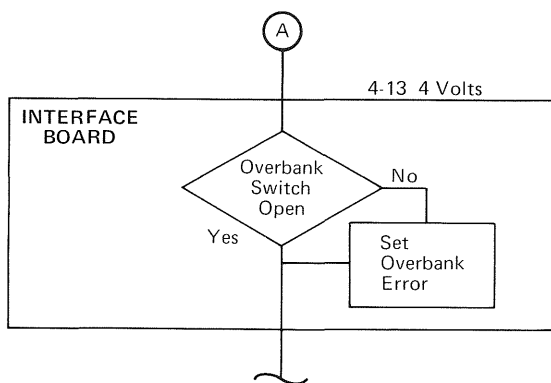


CARRIER RETURN

Carrier Return Command From System

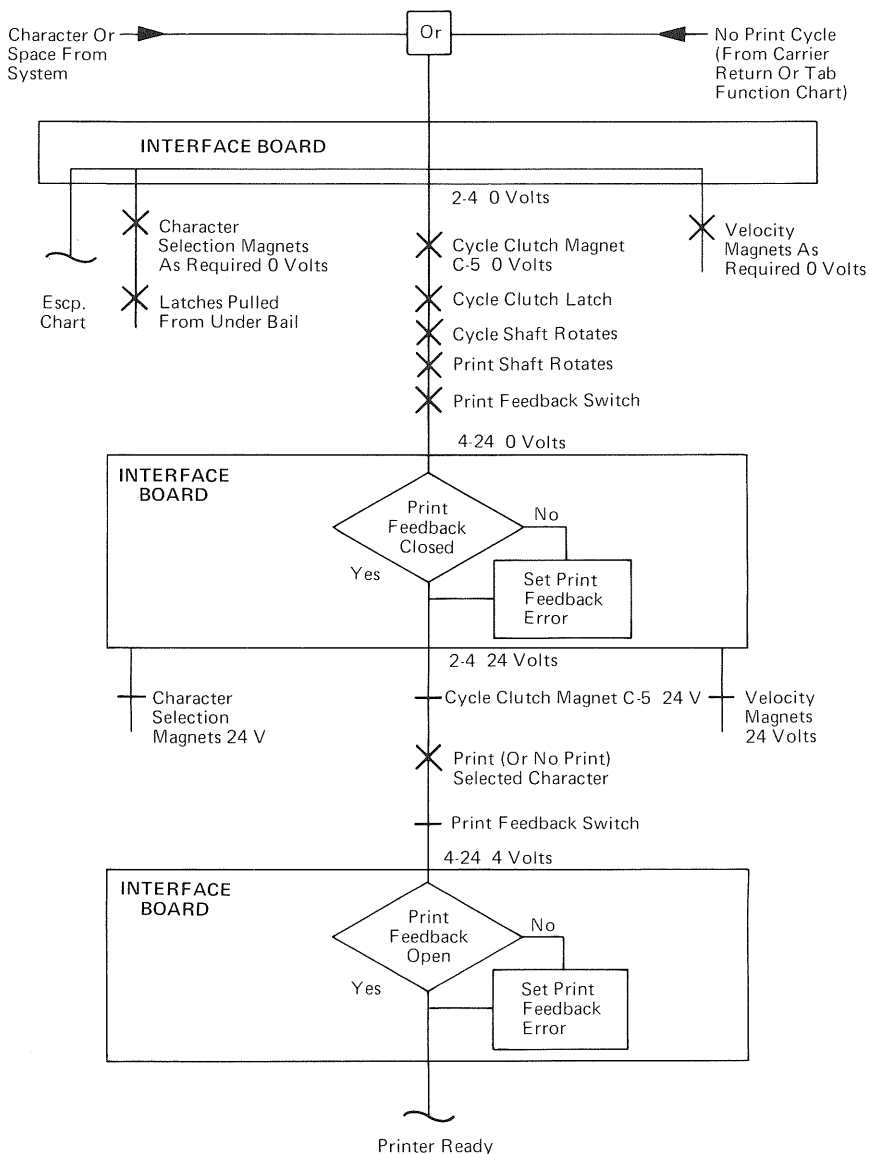


CARRIER RETURN (CONT)



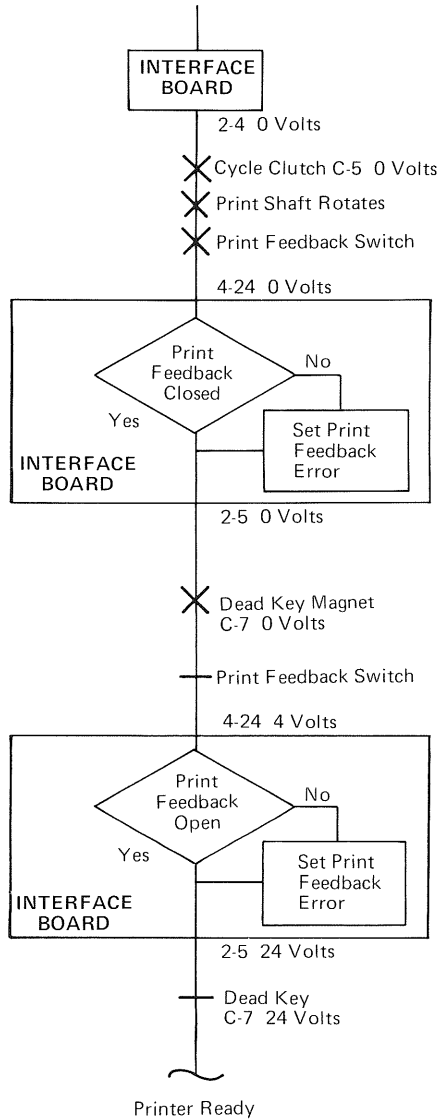
Carrier At Left Margin Final Stop

CHARACTER SELECTION



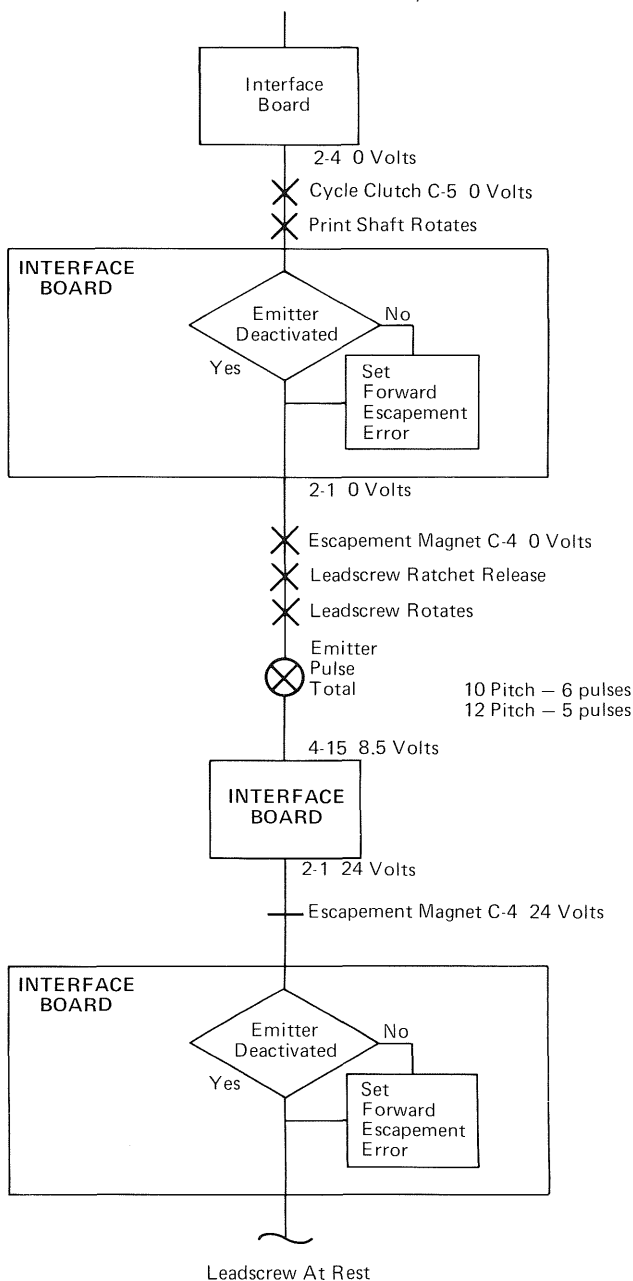
DEAD KEY CYCLE

Dead Key Command From System



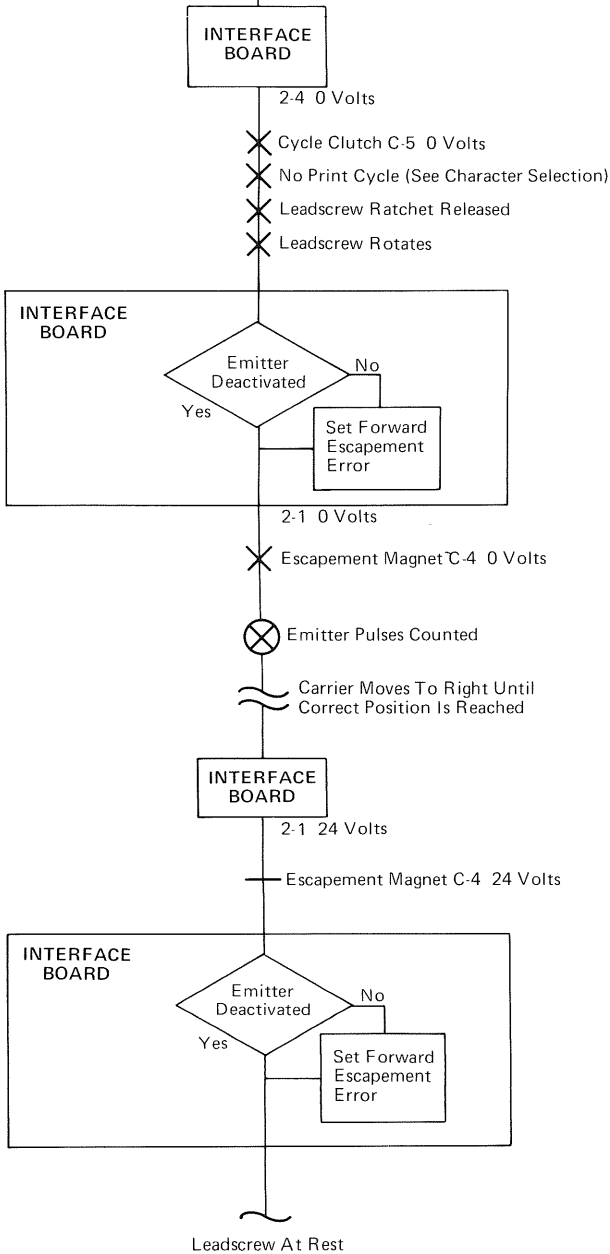
ESCAPEMENT

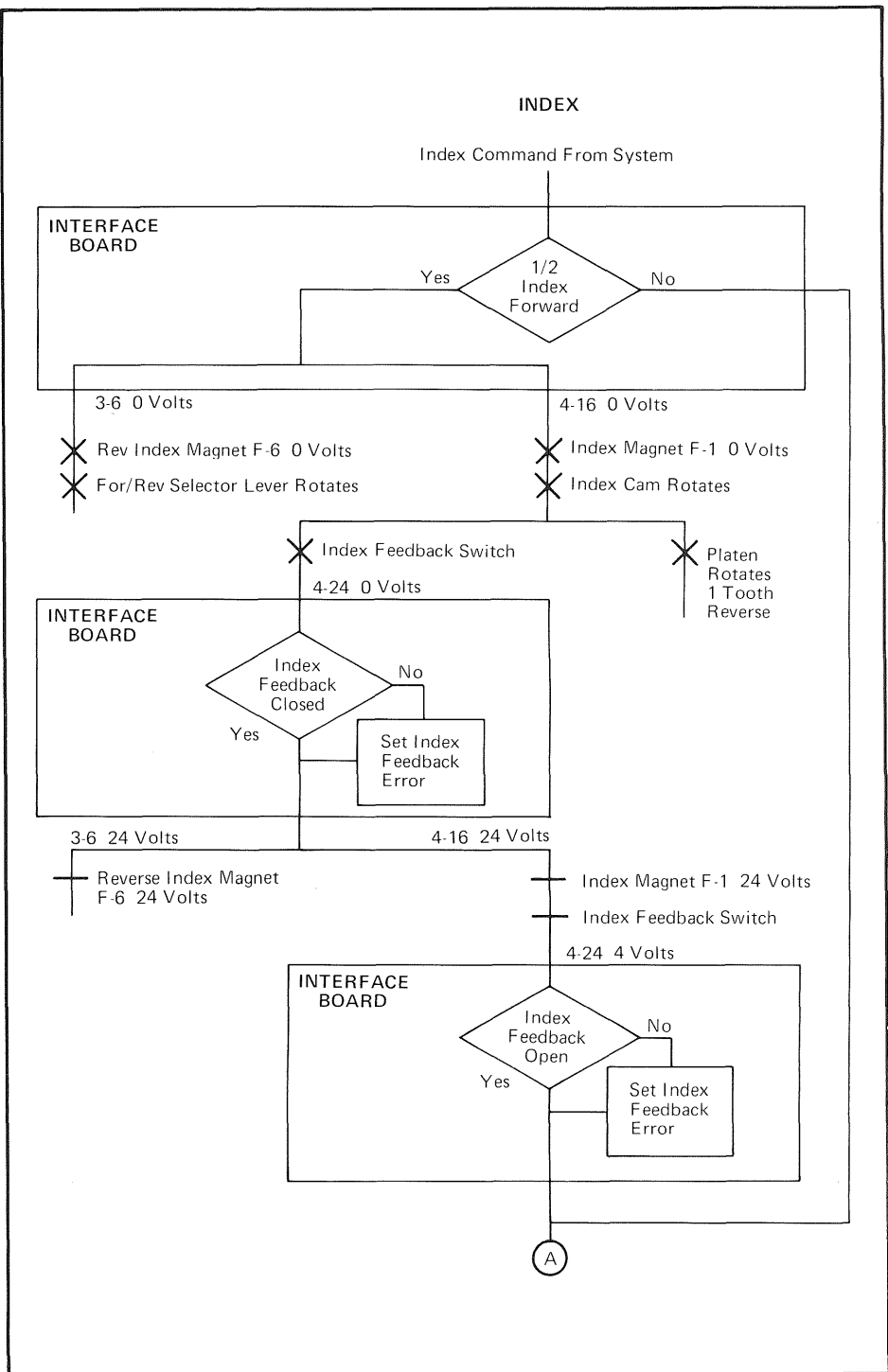
Print Character Command From System



TAB

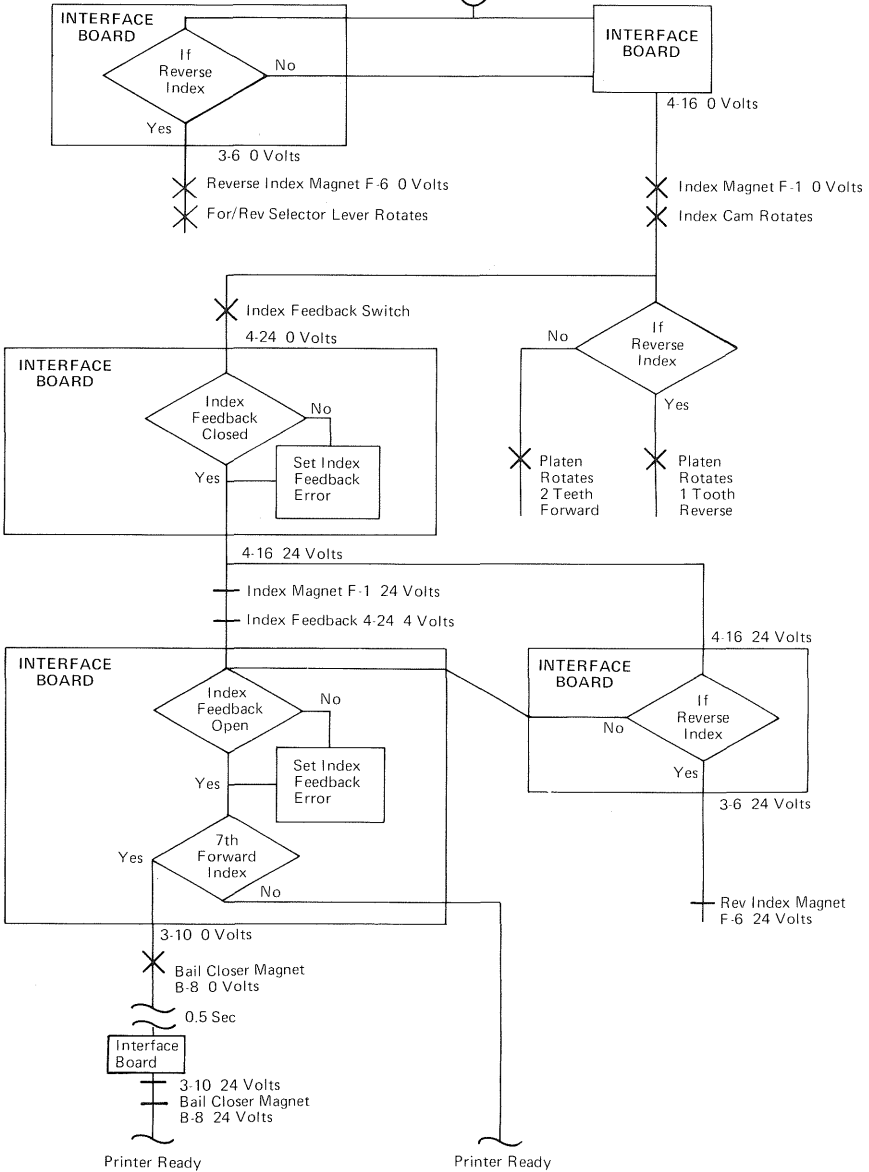
Tab Command From System (Long Escapement)



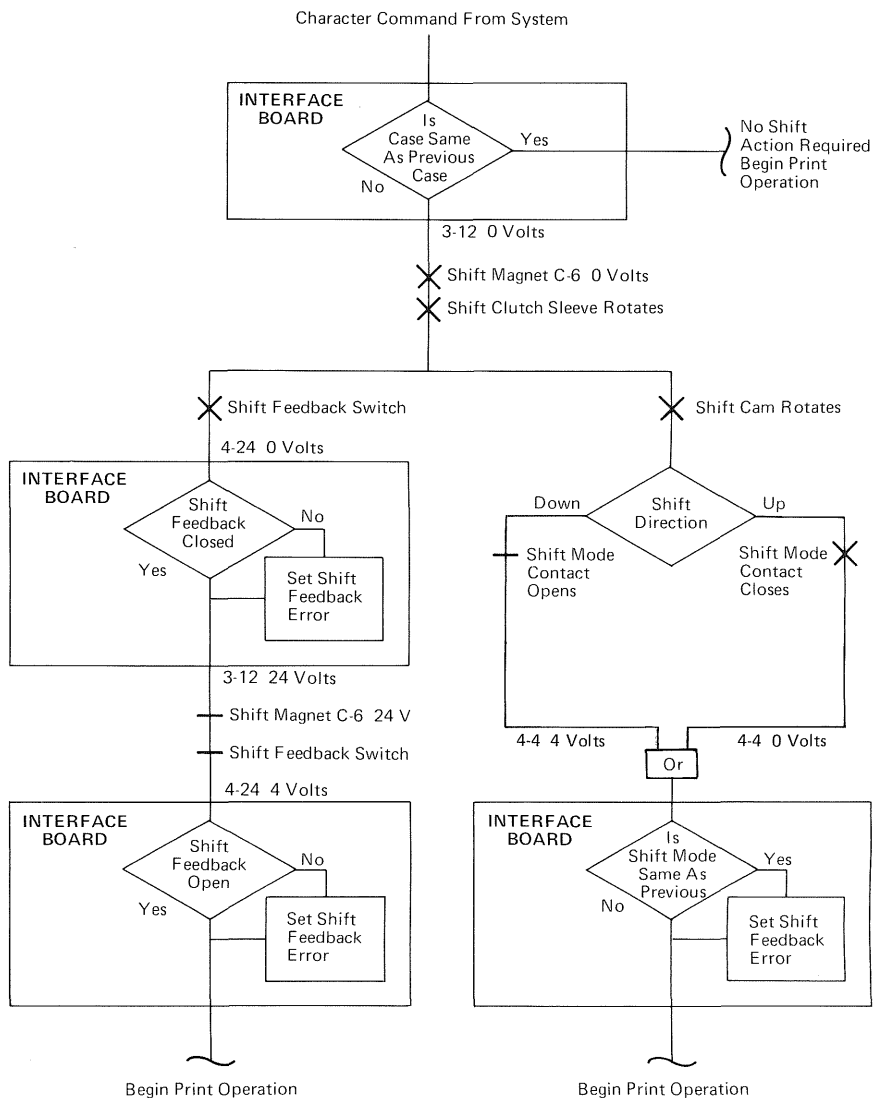


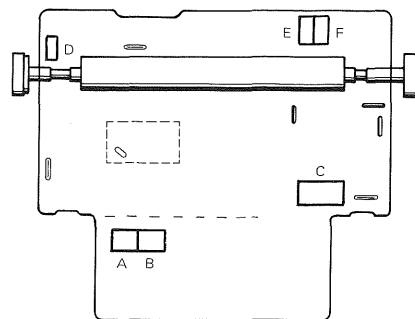
INDEX (CONTINUED)

(A)

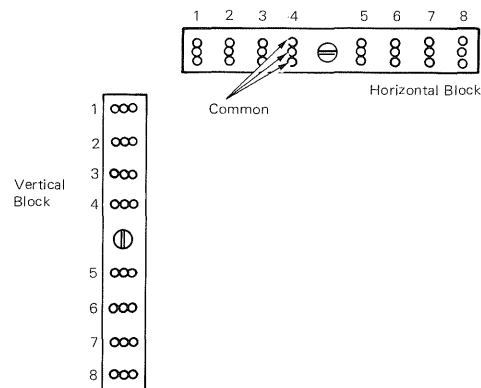


PRINTER SHIFT CYCLE

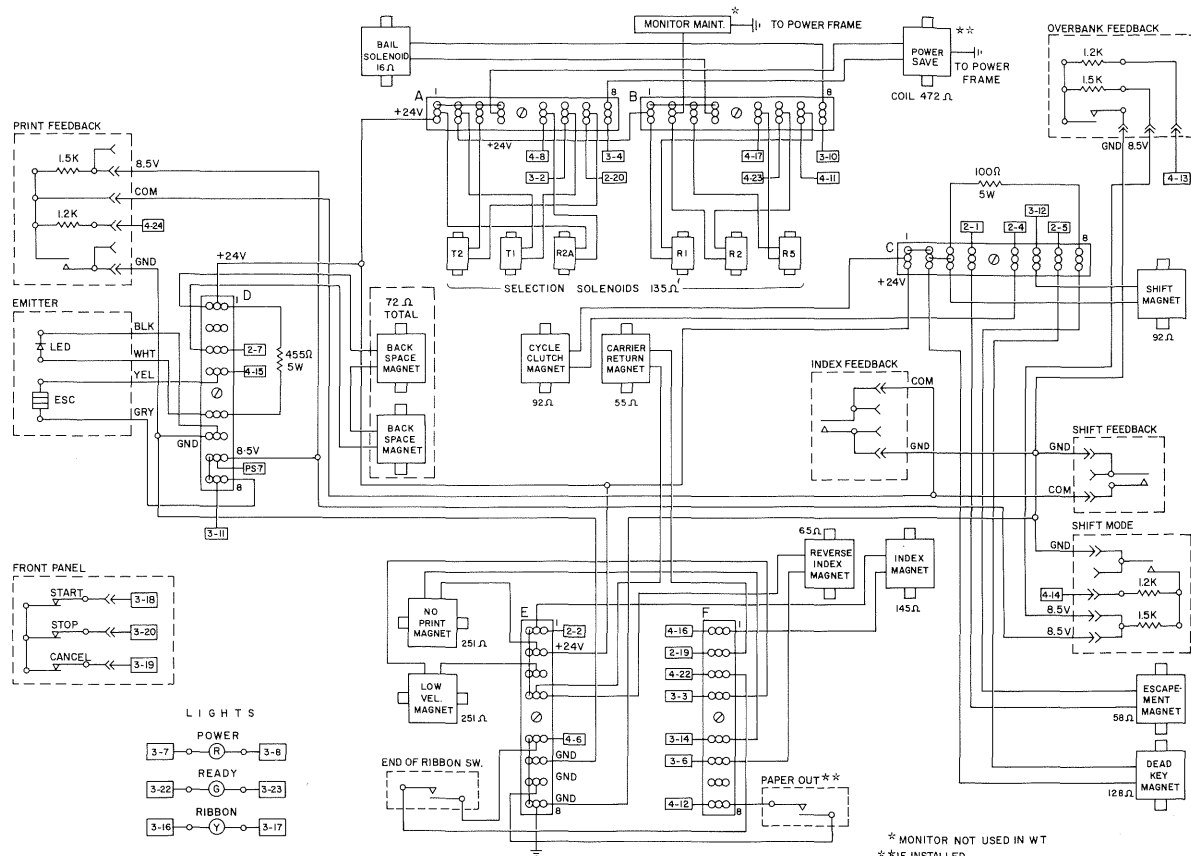




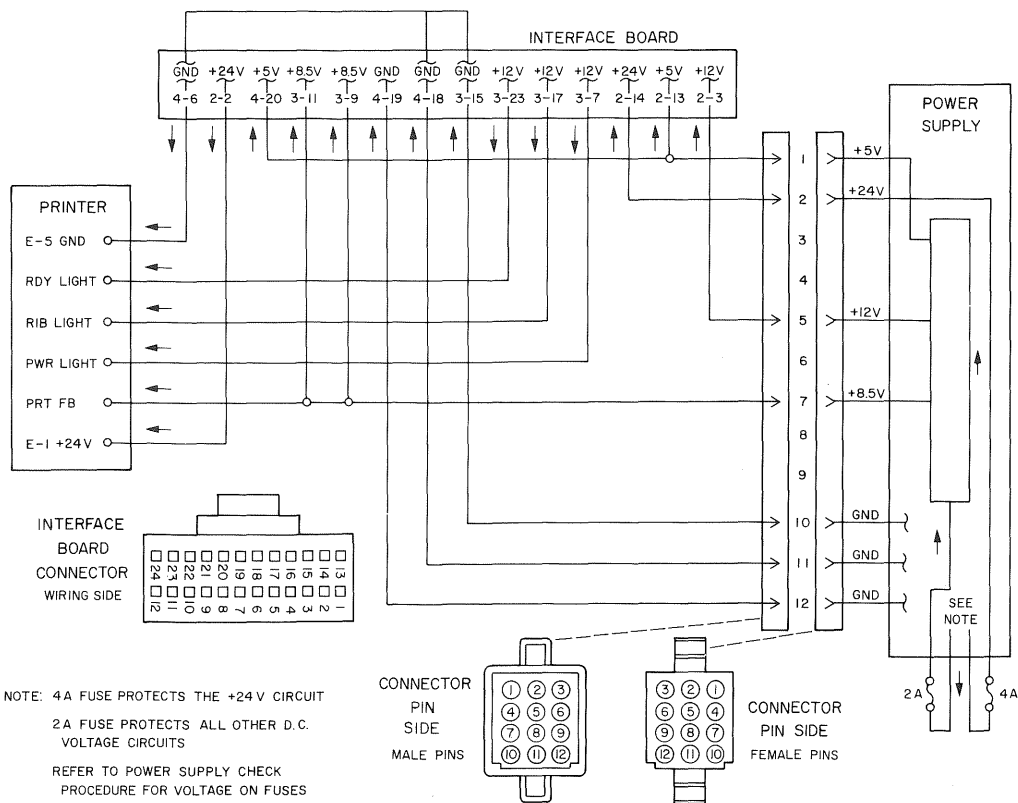
Terminal Block Locations

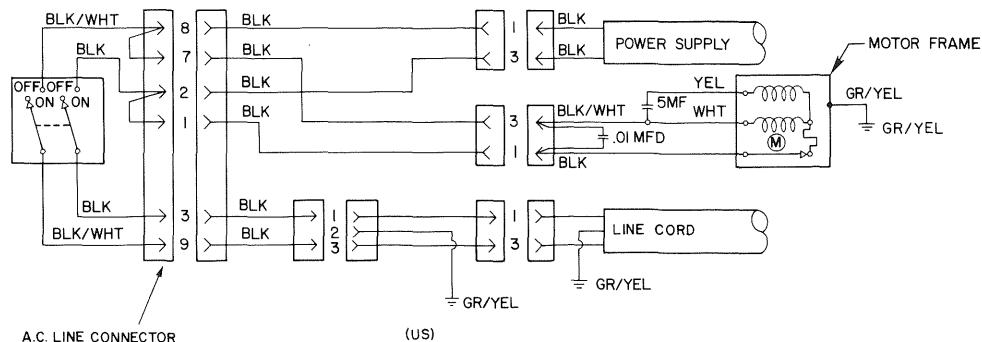
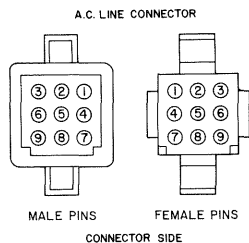


Terminal Block Numbering

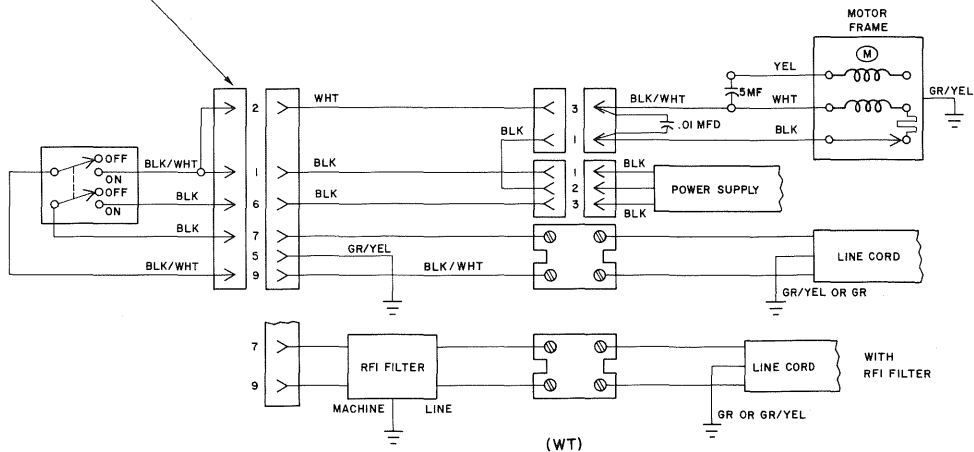
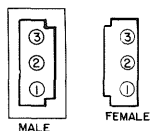


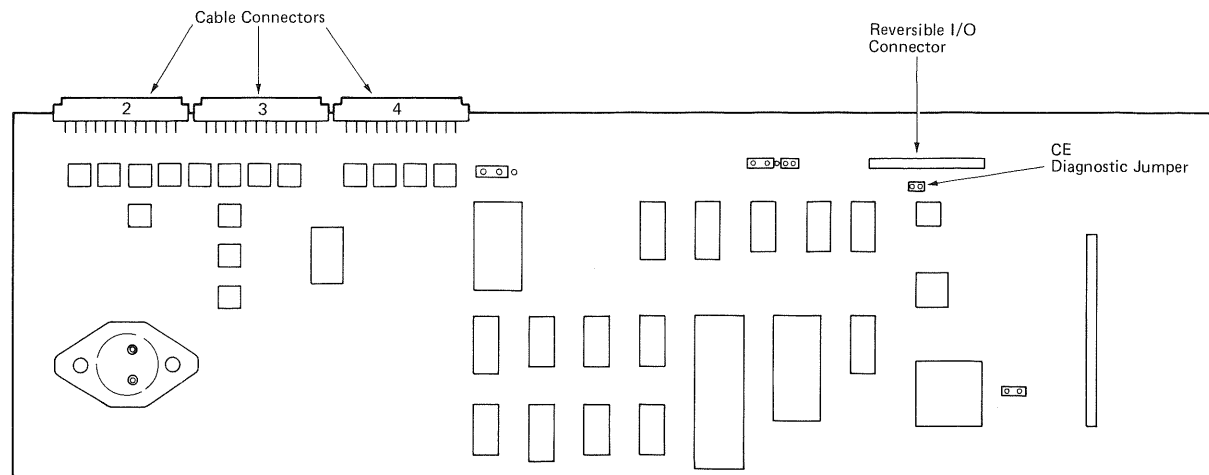
* MONITOR NOT USED IN WT
** IF INSTALLED





MOTOR, LINE CORD AND
POWER SUPPLY AC CONNECTOR
CONNECTOR SIDE





Interface Board

Data Wrap

The "Selectric" Element Printer permits two types of data wrap tests; however, both must be started by the system.

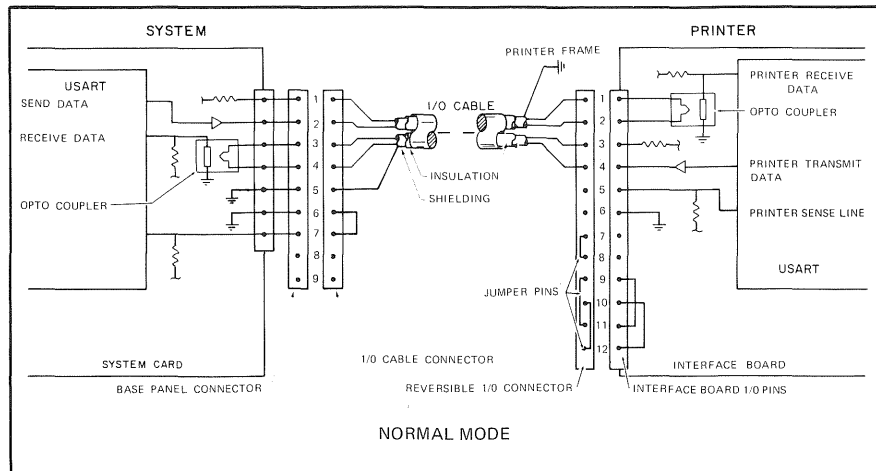
To ensure data can be successfully exchanged before an actual print job is started, the first test is performed automatically by the system before it begins to use the printer. Eight data bytes are sent to the printer and wrapped through a portion of the printer interface board and returned to the system. These data bytes are transferred on a one-for-one basis. The system will send one byte and wait for it to be returned before the next byte is

transmitted. This supplies a limited checkout of the printer electronics and the printer-to-system cable.

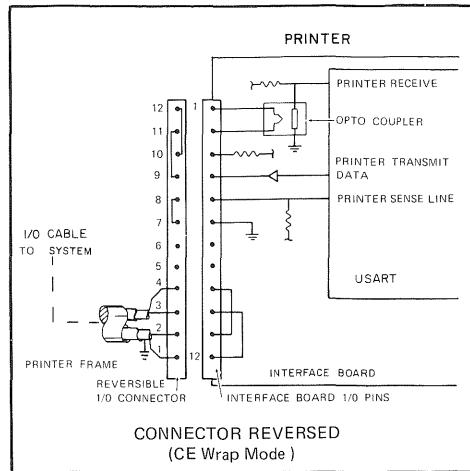
The second test is performed by the CE for diagnostic purposes if the first test should fail. The connector located on the printer interface board can be removed and turned around or reversed for this test. When the connector is reversed, all data transmitted to the printer is sent back to the system without going through any of the printer electronics. During this test, the printer interface board pin 5 is shorted to ground through connector pins 7 and 8 to interface pin 6. This causes the

printer sense line signal to go to approximately 0 VDC. By grounding this line the printer electronics is notified that the connector is physically reversed.

If the first type of test fails and the second succeeds, the problem is in the printer. If both fail, the problem is most likely in the system or the cable between the printer and the system. If both tests pass, and the failure is still present, it could be in either the printer, cable or the system. Additional diagnostic testing would then be required to isolate the problem and repair the failing equipment.



PRINTER/SYSTEM INTERFACE



POWER SUPPLY CHECK PROCEDURE

FUSE CHECK (VOLTAGE WITH POWER ON)

30 VDC Scale

4 amp fuse — 24 VDC both end caps to ground.

2 amp fuse — 9.5 to 16 VDC both end caps to ground.

If no voltage present, check primary fuse.

FUSE CHECK (RESISTANCE WITH POWER OFF)

RX1 Scale — 0 ohms between end caps with fuse disconnected from its circuit.

AFTER REPLACING A BLOWN FUSE AND BEFORE APPLYING POWER:

1. All power off — disconnect 12-position power supply connector.
2. Power on
 - A. Fuse blown — replace power supply.
 - B. Fuse OK — go to step 3.
3. Power off
4. Check interface board side of power connector RX1 scale.
 - A. Check voltage lines for short to pin 12.*
 - B. Check for voltage lines shorted together. Connect one lead to a voltage line and probe the other voltage lines. Repeat for each voltage line.*

*SOME RESISTANCE READINGS MAY BE MEASURED BUT SHOULD NEVER BE A DIRECT SHORT (ZERO OHMS).

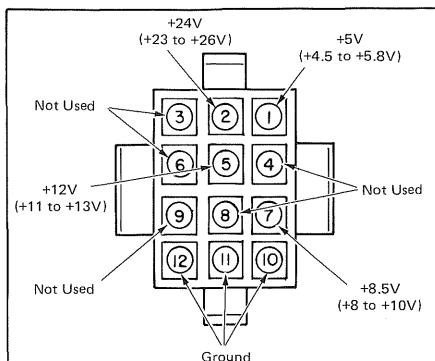
5. Short indicated
Check DC cables, connectors, printer or interface board.

6. No short indicated
 - A. Repeat last operation in progress before fuse blew.
 - B. Perform printer tests.
 - C. An intermittent short may be detected by tilting the printer, pulling the cables, etc.

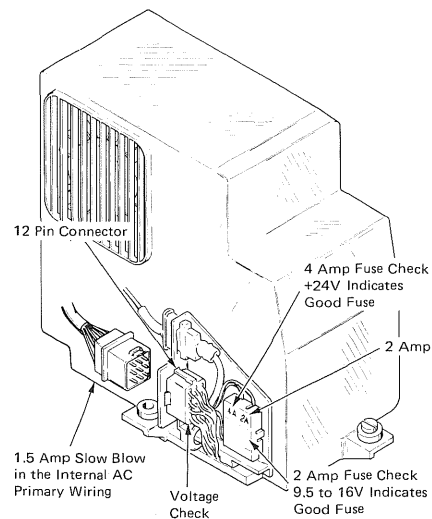
POWER SUPPLY CONNECTOR OUTPUT

1. Disconnect power supply DC connector.
2. Using pins 10, 11 and 12, check voltages for indicated range as shown in drawing.

NOTE: If voltages read low, turn power off, reconnect DC connector and wait 30 seconds. Repeat from step 1. (Power supply may turn itself off without damage if voltage read low.)



Power Supply Connector Wiring Side



Power Supply

CE Diagnostics		MDIs Printer		MEMORY XXXX	
CEDXXX				Kyb XXX	
			PRINTER TESTS		
			DIAGNOSTIC/ADJUSTMENT		
<u>ID</u>	<u>FUNCTIONAL</u>	<u>ID</u>	<u>ITEM</u>	<u>ID</u>	<u>ITEM</u>
a	S Print Exercise	i	Rotate	t	Backspace
b	F Customer Print	j	Tilt	u	Tab
c	Space/Backspace	k	Ribbon Feed	v	Card Holder
d	Shift	l	Index	w	Sel. Latch (all)
e	Tab	m	Double Index	x	Sel. Latch (each)
f	Word Underscore.	n	Triple Index	y	Dead Key
g	Overbank	o	Reverse Index	z	Paper Bail
h	Reverse Index	p	Shift	aa	Ribbon Sensor
		q	Velocity	bb	Paper Sensor
		r	Carrier Return	cc	Echo Print
		s	Space		
'message line 1 . . . '					
'message line 2 . . . '					
'message line 3 . . . '					
Type ID letter to choose ITEM, press ENTER:					
'system message line . . . '					

NOTE: This Printer Test Menu is for reference only and is subject to change with future software revisions.

TEST NAME	PRINTER ACTION
Rotate*	Print "T" "O" "M" "W" "t"
Tilt*	Print "z" "j"
Ribbon*	Print 40 underscores Print 40 "H"s
Index	Print one underscore Forward index
Double Index	Print one underscore Forward index twice Restore
Triple Index	Print one underscore Forward index three lines Restore
Reverse Index	Print one underscore Reverse index one-half line
Shift*	Print lower case "z" Print upper case "Z"
Velocity*	Print "Z" Print "." No print cycle
Carrier Return	Long escape 80 spaces (10 pitch) Restore
Space	Short escape 80 single spaces Restore
Backspace	Long escape 80 spaces (10 pitch) Backspace 80 single spaces

*Press the STOP button to advance to the next operation within the test.

TEST NAME	PRINTER ACTION
Tab	Tab 4 times, 15 spaces each Restore
Dead Key	Print D (no escape) Print underscore Print comma Print K (no escape) Print underscore
Cardholder	Print twenty "V"s, one "I", twenty "V"s Double index, carrier return Print twenty "V"s, one "I", twenty "V"s Center carrier on "I"
Selection Latches (All)	Print a negative five tilt three character
Selection Latches (Each)*	Print "w" (T1) Print "b" (T2) Print "y" (R1) Print "j" (R2) Print "q" (R2A) Print "/" (R5)
Paper Bail	Forward index seven lines Activate paper bail solenoid
Ribbon Sensor	Center carrier (Follow system prompts)
Paper Sensor	No printer action required (Follow system prompts)
Echo Print	Keyboard entry

Error Identification

Printer electronic and mechanism errors are as follows:

Print Feedback — indicates the expected print feedback signal was not sensed within a timeout period. For example, when the cycle clutch magnet is activated, the print feedback switch is expected to close within a specified time. When the switch closes, the cycle clutch magnet is deactivated. The print feedback switch is also expected to open within a specified time. If the switch appears to be stuck open or closed, one of the timeouts is exceeded and a print feedback error is sent to the system.

Shift Feedback — indicates a shift operation was not detected by the feedback switch within the permitted response time or the shift mode is incorrect.

Overbank Feedback — indicates the overbank switch did not operate during the expected response time.

Index Feedback — indicates an index operation was not sensed within the permitted response time.

NOTE: The printer electronics only recognizes that a feedback error occurred. The individual error messages for the print, shift, index and overbank feedback are sent by the printer electronics after determining which operation was being performed when the error was sensed. This is necessary because the four feedback signals are combined on the interface board into one error signal.

Therefore, the individual feedback circuit indicated on the display should be considered as the most likely, but NOT the only, cause of the error.

Forward Escape — indicates the required number of emitter pulses were not sensed within a timeout period. This situation can occur while performing the following operations:

- Four emitter pulses are not sensed while waiting for the leadscrew speed to stabilize when homing.
- The time between emitter pulses exceeds a timeout while homing.
- An emitter pulse is not sensed following the home pulse when homing.
- The requested number of emitter pulses are not sensed when performing a forward escapement of more than six units.
- An overlapped forward escape was not completed while executing the following operation or before the idle state was entered.

Reverse Escape — indicates the required number of emitter pulses were not sensed within a timeout period. It also is used to indicate that the end of the last emitter pulse was not sensed.

Overbank (Unexpected) — indicates an overbank switch closure was sensed while backspacing. This condition occurs when a backspace is attempted at the left margin final stop.

Other detectable errors include parity, frame and overrun errors. When they are sensed during diagnostics, the USART which received the error will be identified along with the error type.

Parity Error — indicates the sum of the data bits received was incorrect.

Frame Error — the stop bit position of the data received was incorrect.

Overrun — indicates the data was received faster than it could be processed.

Error Recovery (Restore Command)

The restore command is normally used for printer error recovery. This command will cause the carrier to be returned to the left margin final stop, but does not cause an index operation. It is also used to reset printer status. The printer rejects all other print commands when an error occurs.

If the restore operation is not successful, another exception response byte will be sent by the printer to indicate another printer error, and the new error indication will be displayed.

The restore command also provides recovery from an unexpected overbank switch closure. The restore operation will cause a forward escapement until the overbank switch opens and then homes the leadscrew.

The position of the shift mechanism is compared with the expected position during a carrier return. If they are different, a shift operation is performed and a shift error is indicated. Although the position is now correct, a restore command is required to clear the printer status.

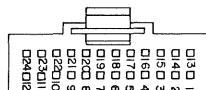
All voltages are positive DC $\pm 10\%$. All readings are taken with the printer in the normal mode, not ready state, end-of-ribbon sensor held down and machine in lower case.

CAUTION

Turn power off before disconnecting an interface board connector.

INTERFACE BOARD
CONNECTOR

WIRING SIDE



Before replacing an interface board:

- Check the connectors for loose, broken, or bent pins.
- Reseat jumpers and connectors.
- Check Power Supply input voltages.

The Power Supply ground inputs must be checked in two ways:

1. Check for less than 0.6 VDC between the ground pins on the board connectors and frame ground.
2. Check each ground pin on the board and one of the input voltages already checked. If the readings are not the same (± 0.6 VDC), a faulty ground circuit is indicated (loose connection, broken wire, etc.).

POSITION NO. 2 INTERFACE BOARD CONNECTOR				
Pin	Static	Active	Name	Terminates
1	+24	\emptyset	Escapement Magnet	C-4
2	+24	+24	+24 VDC	E-1
3	+12	+12*	+12 VDC	PS-5
4	+24	\emptyset	Cycle Clutch Magnet	C-5
5	+24	\emptyset	Dead Key Magnet	C-7
6				
7	+24	\emptyset	Backspace Magnet	D-6
8				
9				
10				
11				
12				
13	+5	+5*	+5 VDC	PS-1
14	+24	+24*	+24 VDC	PS-2
15				
16				
17				
18				
19	+24	\emptyset	Carrier Return Magnet	F-2
20	+24	\emptyset	T2 Magnet	A-7
21				
22				
23				
24				

POSITION NO. 3 INTERFACE BOARD CONNECTOR				
Pin	Static	Active	Name	Terminates
1				
2	+24	\emptyset	T1 Magnet	A-6
3	+24	\emptyset	Low Velocity Magnet	F-4
4	+24	\emptyset	Power Save Relay**	A-8
5				
6	+24	\emptyset	Reverse Index Magnet	F-6
7	+6	+6	Power Light	At Light
8	\emptyset	\emptyset	Power Light Ground	At Light
9	+8.5	+8.5*	+8.5 VDC	PS-7
10	+24	\emptyset	Bail Magnet	B-8
11	+8.5	+8.5*	+8.5 VDC	PS-7
12	+24	\emptyset	Shift Magnet	C-6
13				
14	+24	\emptyset	No Print Magnet	F-5
15	\emptyset	\emptyset *	Magnet Ground	PS-10
16	+12	\emptyset	Ribbon Light	At Light
17	+12	+6	Ribbon Light	At Light
18	\emptyset	+5	Start	At Switch
19	\emptyset	+5	Cancel	At Switch
20	\emptyset	\emptyset	Switch Ground	At Switch
21				
22	+12	\emptyset	Ready Light	At Light
23	+12	+6	Ready Light	At Light
24				

POSITION NO. 4 INTERFACE BOARD CONNECTOR				
Pin	Static	Active	Name	Terminates
1				
2				
3				
4				
5				
6	\emptyset	\emptyset	Ground	E-5
7				
8	+24	\emptyset	R2A Magnet	A-5
9				
10				
11	+24	\emptyset	R1 Magnet	B-7
12	+5	\emptyset	Paper Out **	F-8
13	+4	\emptyset	Overbank	At Switch
14	+4	\emptyset	Shift Mode	At Switch
15	0	+8.5	Emitter	D-5
16	+24	\emptyset	Forward Index Magnet	F-1
17	+24	\emptyset	R5 Magnet	B-5
18	\emptyset	\emptyset *	Ground	PS-11
19	\emptyset	\emptyset *	Ground	PS-12
20	+5	+5*	+5 VDC	PS-1
21				
22	+5	\emptyset	End of Ribbon	F-3
23	+24	\emptyset	R2 Magnet	B-6
24	+4	\emptyset	Feedback (print/shift/index)	At Switch

* Power Supply Input

** If Feature Installed

The following information is to aid the Customer Engineer in generating an inspection procedure for a specific machine. Those areas shown below should not be the only areas which receive attention. Since each machine installation will differ slightly in application and environment, this procedure is to be used only as a guide.

EVERY CYCLE

- A. Note operator's comments.
- B. Perform a complete series of functional tests.
- C. Lubricate typehead lever pivot points and inside surface with No. 23 grease or silicone lubricant.
- D. Clean cardholder with No. 10 oil.
- E. Clean the following points with IBM Cleaning Fluid.
 1. Platen
 2. Deflector
 3. Feed rolls
 4. Bail rolls

CYCLE A

- A. Check the rotate and tilt homing adjustments.
- B. Check the carrier and alignment adjustments.
- C. Lubricate the following points in the printer.

No. 10 Oil (Bottom of Machine)

1. Rotate link pivots
2. Positive latch bail pivots (wicks)
3. Positive latch bail roller pivots
4. Negative latch bail pivot
5. Negative latch bail roller pivot
6. Shift arm pivot (wick)
7. Cycle shaft gear plate bearing

No. 23 Grease (Bottom of Machine)

1. Velocity yoke slider

CYCLE B

No maintenance required.

CYCLE C

- A. Check the impression and velocity adjustments.
- B. Lubricate the following points in the printer.

No. 10 Oil (Top of Machine)

1. Rotate and tile pulleys
2. Idler gear bearings
3. Left cycle shaft bearing
4. Tilt arm pivot
5. Rotate arm pivot (wick)
6. Motor
7. Print shaft bearings
8. All selection latches and differential lever pivots
9. Rotate bellcrank
10. Top of rotate bellcrank (wick)
11. Center bearing
12. Index cam (wick)
13. Index cam follower pivot (wick)
14. Escapement cam follower pivot (wick)
15. Shift arm pulley
16. Shift cam backup roller
17. Shift arm roller
18. Print shaft wipers
19. Print cam follower pivot
20. Tilt ring pivot pins
21. Upper ball sockets
22. Tilt bellcrank and link
23. Rocker shaft
24. Motor belt idler roller
25. Escapement clutch (3 drops) (wick)
26. Leadscrew drive shafts
27. Escapement knockoff arms (wick)
28. Leadscrew center support

CYCLE D

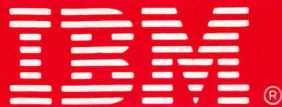
- A. Power clean the printer and wash covers.
- B. Lubricate the following points in the printer.

No. 23 Grease (Top of Machine)

1. Idler gear teeth
2. Cycle clutch restore cam
3. Cycle clutch (keep grease off magnet armature)
4. Front carrier support
5. Clutch ratchets
6. Paper release lever cam surface
7. Operational shaft bearing and shift clutch spring
8. Ribbon lift cam
9. Detent cam
10. Rear rail
11. Leadscrew
12. Print cams
13. Ribbon feed cam
14. Ribbon cam windows and surface
15. Paper bail bellcrank pivot
16. Paper bail link eccentric and bail link pivot
17. Bail closer solenoid pin

No. 10 Oil

1. Ribbon lift guide slots (1 drop)
2. Ribbon lift arm pivots
3. Ribbon lift cam follower roller and pivot
4. Ribbon feed roller
5. Ribbon spike driver pivot



International Business Machines Corporation
Office Products Division
Customer Engineering

IBM "Selectric" Element Printer
Displaywriter System S241-6249-0

S241-6249-0

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